TO STUDY THE EFFECTIVENESS AND OUTCOME OF INCREMENTAL HEMODIALYSIS IN END STAGE RENAL DISEASE PATIENTS

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Dedicated

to

my Family

&

Teachers

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Dr. Abhinav Kumar

LIST OF ABBREVIATIONS

ESRD – End stage renal disease

DM – Diabetes mellitus

ADPKD – Autosomal dominant polycystic kidney disease

CGN – Chronic glomerulonephritis

HTN – Hypertension

+ve – positive

Pts – patients

JVP – jugular venous pressure

B/L – Bilateral

U/L – Unilateral

Ml/min – milliliter/minute

IOL – Intraocular lens

NPDR – non-proliferative diabetic retinopathy

PDR – proliferative diabetic retinopathy

ENT – Ear nose and throat

CLD – Chronic liver disease

CAD – Coronary artery disease

Hep B – Hepatitis B

Hep C – Hepatitis C

HIV – Human immunodeficiency virus

Yrs – Years

No. – number

Incre – Incremental

LRTI – Lower respiratory tract infection

CRBSI – Catheter related blood stream infection

DKA – Diabetic ketoacidosis

N – No

Y – Yes

Ml – milliliter

Hb – Hemoglobin

Hrs – hours

Gm/dl – gram/deciliter

Mg/dl – milligram/deciliter

PTH – parathyroid hormone

Pg/ml – picogram/milliliter

Nmol/L – nanomole/liter

Vit D3 – Vitamin D3

Ng/ml – Nanogram/milliliter

SGOT – Serum glutamic-oxaloacetic transaminase

SGPT – serum glutamic-pyruvic transaminase

ALP – alkaline phosphatase

IU/L – international Unit/liter

2^{nd} – second

RCT – Randomized control trial

RKF – residual kidney function.

UOP – Urine output

KRU – residual urea clearance

Non-RCT – non-Randomized control trial

I-HD – incremental hemodialysis

HR – hazard ratio

HD – hemodialysis

TW – thrice a week

I-HD – Incremental hemodialysis

PD – Peritoneal dialysis

UF – ultrafiltrate

Ml/kg/hr – milliliter/kilogram/hour

Ml/month – milliliter/month

WHO QOL - BREF – World health organization quality of life scale brief version

A-V Fistula – Arterio-venous fistula

M – Male

F – Female

%age – percentage

2x group – twice a week group

3x group – thrice a week group

RKF – residual kidney function

TW-HD – twice weekly hemodialysis

I-HD – incremental hemodialysis

KDRD – Kidney dysfunction requiring hemodialysis

DKD – Diabetic kidney disease

VS – versus

ABSTRACT

Introduction: Thrice-weekly hemodialysis was a concept introduced three decades ago and requires consideration in the present-day scenario of sophisticated dialysis machines, advanced dialysis membranes, and ultrapure water. Twice-weekly maintenance hemodialysis is not an accepted form of hemodialysis primarily because there are not enough studies to prove its sustainability. In our country, the conventional thrice a week and even twice a week hemodialysis sessions at the time of initiation are usually not accepted by the patients and their relatives However, with the concept of incremental dialysis and residual renal function (RRF) is gaining ground, this can prove to be a good option for initiation of hemodialysis.

Aims and Objectives: To evaluate the effectiveness and outcome of incremental hemodialysis in end stage renal disease patients.

Methods: we conducted a prospective observational study of 68 ESRD patients. Patients being initiated on MHD of either gender in age group 18-65 years were included and followed for 6 months.43 patients in incremental group and 25 patients in regular twice weekly hemodialysis group were analysed. At the end of 6 months, the primary outcome of interest included all-cause mortality. Secondary outcomes included quality of life, residual renal function, incidence of transition to more frequent hemodialysis and morbidity including no. of hospitalisation.

Results: Among total 68 patients, 43 patients in incremental group and 25 patients in regular twice weekly hemodialysis group were followed and analysed. Among the 43 patients in the incremental hemodialysis group, 2 patients (4.7%) died, whereas in the regular twice-weekly hemodialysis group comprising 25 patients, 3 patients (12%) died (p=0.263). Quality of life as per WHOQOL-BREF score was better in incremental hemodialysis group, however, statistically insignificant. Urea clearance, creatinine clearance and residual renal function were better preserved in incremental hemodialysis group and found to be statistically significant (p=0.001). No significant difference was found in terms of morbidity including no. of hospitalisations and other biochemical parameters.

Conclusion: In the present study, the outcomes of incremental hemodialysis, in terms of mortality, residual renal function, quality of life and biochemical parameters were not found inferior to regular twice weekly hemodialysis. However, morbidity including the no. of admissions was more in incremental hemodialysis group. In developing country like India, where resources are limited and conventional thrice a week and even twice a week hemodialysis sessions are usually not accepted by the patients and relatives, incremental hemodialysis may be a good option. To prove the sustainability of this study, larger sample size and longer follow up are required.

Keywords: ESRD, MHD, Incremental hemodialysis, Residual renal function.

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INTRODUCTION

In the 19th century, Scottish chemist Thomas Graham now known as the “Father of Dialysis” introduced osmosis and dialysis as similar method used in chemical laboratories that allowed the separation of dissolved substances or removal of water from solutions through semipermeable membrane.[1,2] In the year 1913, Abel, Rowntree and Turner “dialized” anaesthetised animals by directing their blood outside the body and through tubes of semi-permeable membrane made from collodion, a material based on cellulose. The dialysis treatment today is based on Abel’s vividiffusion machine. To prevent clotting of blood Abel and colleagues had used a substance known as hirudin, an anticoagulant element derived from the saliva of leeches.[3] It was a German doctor by the name of George Haas who performed the first dialysis treatments on humans. Like Abel he used hirudin as anticoagulant which led to massive complications from allergic reaction as it was not adequately purified and originated from a species very distant from humans. So, later he introduced heparin in his seventh and final experiment and was successful and heparin as anticoagulant continues to be used even today.[4] In the year 1945, William Kolff of Netherlands did the first successful dialysis treatment on a 67 year old patient admitted for acute kidney failure. A week long dialysis was performed used a rotating drum kidney that used membranous tubes made of cellophane, a cellulose-based material used in the packaging food industry. The patient was later discharged with normal kidney function. Kolff’s work sparked a flurry of activity around the world to develop more improved and effective dialyzers.[5] Belding Scribner of United States made a new breakthrough by introducing a relatively simpler means of accessing patient’s circulatory system that could be used over period of months in patients of chronic kidney disease. Later this came to be known as “Scribner shunt”.[6] Today lack of adequate treatment or technologies is no longer a challenge. One of the current challenge is the optimal prescription (frequency, duration, dose) of hemodialysis(HD).

Historically, patients underwent dialysis every 5 to 7 days with recurrence of uremic symptoms being guide for further dialysis. However intensification of treatment from twice weekly to shorter 6-8 hours thrice-weekly overnight treatment was adopted based on nocturnal hemodialysis experience.[7] Later thrice-weekly dialysis became the usual practice as the most adequate and cost efficient strategy. In most of the developed countries majority of patients with End stage Renal Disease(ESRD) receive the thrice a week HD regimen to achieve a minimum dialysis single pool Kt/V_{urea} >= 1.2 and urea reduction ratio(URR>=65%), whether the patient is new to dialysis or has been undergoing dialysis therapy for a while. However, such regimen can have a bearing on health care resources especially in developing countries like India. India with 17% of the world population, majority do not have access to basic healthcare facilities.The primary goal of healthcare initiatives is to provide quality care and concurrently rationalize costs. In underdeveloped nations, nephrologists are well versed with the concept of twice-weekly hemodialysis, which is an unspoken accepted norm. Thrice-weekly hemodialysis was a concept introduced three decades ago and requires consideration in the present-day scenario of sophisticated dialysis machines, advanced dialysis membranes, and ultrapure water.[8]

Incremental HD is the gradual adjustment in the dialysis prescription (i.e frequency, treatment time, blood flow, dialysate flow,etc) guided by changes in residual kidney function (RKF). With the concept of incremental dialysis and RKF gaining ground, this can prove to be a good option for initiation of hemodialysis. Various regimens has been studied: twice-weekly HD with later conversion to thrice-weekly HD guided by changes in RKF or changes in clinical status, once- weekly HD with low protein diet followed by more frequent HD schedules or thrice-weekly HD with shorter treatment sessions (<4hours per session) followed by more longer treatment sessions(>4 hours per session).[9] The main challenge is the prescription of Incremental HD is

the lack of clear standards for incorporating RKF in assessment of HD dose.

Over time, there has been increasing recognition of the importance of preservation of residual kidney function (RKF) in dialysis patients. The presence of RKF has been shown to contribute to the overall health and well-being of dialysis patients including improved survival, better nutrition, and reduced inflammation. HD can cause episodic ischemic damage to the kidneys, leading to repetitive bouts of ischaemic events that may accelerate the decline in RKF. According to one theory, progressive loss of the kidney function, the remaining nephrons are activated to undergo compensatory adaptations; initiation of dialysis may lead to deactivation of functioning nephrons and deterioration of RKF. Retrospective and observational studies have shown that twice-weekly HD at dialysis initiation may show better RKF preservation than thrice-weekly HD regimen. RKF in patients with end-stage renal disease plays a critical role in dialysis adequacy, quality of life, and survival by maintaining fluid and metabolic homeostasis, mitigating mineral abnormalities, optimizing uremic toxin clearance, and sustaining higher production of endogenous vitamin D and erythropoietin.[10-12] When patients who have sufficient urine output are given twice-weekly HD, they maintain dialysis adequacy and exhibit better preservation of RRF than patients on thrice-weekly HD.[13] Less frequent HD also means less frequent cannulation of a new arteriovenous access, which may prolong fistula or graft longevity.

A stepped dialysis regimen with scheduled transition from time-delineated twice-weekly HD to thrice-weekly HD could represent a cost effective and safe strategy to standardize incremental HD in patients with CKD transitioning to early-stage ESKD. The progression of CKD (i.e., regression of residual kidney function [RKF]) is usually gradual, over a matter of months to years, transition to dialysis therapy should be incremental and follow a reverse mirror image of RKF, starting with

lower-clearance hemodialysis prescriptions and building up to higher-clearance hemodialysis regimens.

In 2014, an expert opinion paper argued that the mortality rate in patients who transition from predialysis CKD to incident kidney failure is highest in the first months of hemodialysis therapy and that the outright initiation with a thrice-weekly or more frequent hemodialysis regimen, by virtue of causing faster decline in RKF, might be a cause of this sudden surge in death.[14]

There is still lack of prospective studies to test the emerging concept of incremental HD and its effectiveness in defined clinical scenarios. This study will be conducted to demonstrate the effectiveness and outcome of incremental HD in end stage renal disease patients.

AIM AND OBJECTIVES

To evaluate the effectiveness and outcome of incremental hemodialysis in end stage renal disease patients.

REVIEW OF LITERATURE

LIN YF et al 2009.[15] investigated whether ESRD patients having sufficient RRF can be maintained on twice-weekly HD, and how they fare compared to patients without RRF on thrice-weekly HD. They analyzed 74 patients who had undergone long-term HD and maintained on the same dialysis frequency from February 1998 to July 2005, and followed until December 2005. They compared the clinical variables between twice-weekly and thrice-weekly HD patients and a second analysis testing the residual urine output as an independent predictor for twice-weekly HD. After a mean follow up of 18 months, twice-weekly HD patients (n = 23) had lower serum β2-microglobulin than thrice-weekly HD patients (n = 51). Moreover, the twice-weekly group had a slower decline of RRF, as indicated by their higher urine output and creatinine clearance, fewer intradialytic hypotensive episodes, and required less frequent hospitalization. There was no difference between the two groups in cardiothoracic ratio or indices of nutrition and inflammation. Multivariable logistic regression identified age (odds ratio (OR), 1.866; 95% CI, 1.093–3.183), dry body mass index (OR, 0.790; 95% CI, 0.625–0.999), and urine output (OR, 1.093; 95% CI, 1.026–1.164) as predictors for maintaining twice-weekly HD. The data suggested that when patients who have sufficient urine output are given twice-weekly HD, they maintain dialysis adequacy and exhibit better preservation of RRF than patients on thrice-weekly HD.

Shafi T et al 2010 [16] determined the association of urine output with mortality, quality of life (QOL), and inflammation in incident hemodialysis patients. 734 incident hemodialysis participants treated in 81 clinics; enrollment, 1995-1998; follow-up until December 2004. 617 of 734 (84%) participants reported urine output at baseline, and 163 of 579 (28%), at year 1. Baseline urine output was not associated with survival. Urine output at year 1, indicating preserved RKF, was independently associated with lower all-cause mortality (HR, 0.70; 95% CI, 0.52-0.93; P = 0.02) and a trend toward lower cardiovascular

mortality (HR, 0.69; 95% CI, 0.45-1.05; P = 0.09). Participants with urine output at baseline reported better QOL and had lower C-reactive protein (P = 0.02) and interleukin 6 (P = 0.03) levels. Importantly, EPO dose was 12,000 U/wk lower in those with urine output at year 1 compared with those without (P = 0.001). RKF in hemodialysis patients is associated with better survival and QOL, lower inflammation, and significantly less EPO use. RKF should be monitored routinely in hemodialysis patients.

Chertow GM et al 2010 [17] determined whether increasing the frequency of in-center hemodialysis would result in beneficial changes in left ventricular mass, self-reported physical health, and other intermediate outcomes among patients undergoing maintenance hemodialysis. Patients were randomly assigned to undergo hemodialysis six times per week (frequent hemodialysis, 125 patients) or three times per week (conventional hemodialysis, 120 patients) for 12 months. The two coprimary composite outcomes were death or change (from baseline to 12 months) in left ventricular mass, as assessed by cardiac magnetic resonance imaging, and death or change in the physical-health composite score of the RAND 36-item health survey. Secondary outcomes included cognitive performance; self-reported depression; laboratory markers of nutrition, mineral metabolism, and anemia; blood pressure; and rates of hospitalization and of interventions related to vascular access. Patients in the frequent-hemodialysis group averaged 5.2 sessions per week; the weekly standard Kt/V(urea) (the product of the urea clearance and the duration of the dialysis session normalized to the volume of distribution of urea) was significantly higher in the frequent-hemodialysis group than in the conventional-hemodialysis group (3.54±0.56 vs. 2.49±0.27). Frequent hemodialysis was associated with significant benefits with respect to both coprimary composite outcomes (hazard ratio for death or increase in left ventricular mass, 0.61; 95% confidence interval [CI], 0.46 to 0.82; hazard ratio for death or a decrease in the physical-health composite score, 0.70; 95% CI, 0.53 to 0.92). Frequent hemodialysis,

as compared with conventional hemodialysis, was associated with favorable results with respect to the composite outcomes of death or change in left ventricular mass and death or change in a physical-health composite score but prompted more frequent interventions related to vascular access.

Fernández-Lucas M et al 2012 [18] summarised the experience during the first 5 years of application of this progressively increasing HD prescription and its repercussions on residual renal function. They included all patients who started periodical HD between 1/1/2006 and 30/9/2010 and remained on dialysis for more than three months. The follow-up period ended on 31/12/2010 (study end date). When a patient started HD, urea and creatinine clearance levels were measured based on urea and creatinine concentrations in blood samples taken before dialysis and in urine samples taken 24 hours prior to starting the first dialysis session of the week. If urea clearance was equal to or greater than 2.5 ml/min, 2 sessions of HD per week were applied, as long as the patient's clinical situation allowed for it (according to the criteria of the attending physician). Residual renal function was analysed every 2 months until diuresis was less than 100ml/day, which is considered to be basically null. They evaluated the decrease in residual renal function, calculating the rate of decrease in glomerular filtration (ml/min/month) and 24-hour diuresis (ml/month) in patients receiving 2 and 3 HD sessions per week. In January 2010, they took a cross-sectional sample, evaluating glomerular filtration and how this value was associated with various clinical and laboratory parameters in patients receiving 2 or 3 dialysis sessions per week. During the study period, 95 patients were included in the study, 41 of which (43%) started with 2 HD sessions per week, and 54 (57%) with 3 sessions per week. The mean time that patients remained on the 2HD sessions/week regimen was 11.1 ± 7.2 months (range: 2-25 months). Of the 41 patients that started with 2 HD sessions/week, 10 received a transplant while on the treatment regimen, 1 was transferred to peritoneal dialysis, 6 recovered renal function and were able to

abandon dialysis treatment, 15 were switched to the 3 HD sessions/week regimen, and 9 continued on the 2 HD sessions/week regimen at the time the study ended. In select populations, the start of HD can be administered on a progressively increasing dosage, starting with two sessions/ week.

Bieber B et al 2014 [19] described the hemodialysis practice in China compared with other DOPPS countries, examining demographic, social and clinical characteristics of patients on two-times weekly dialysis. The DOPPS protocol was implemented in 2011 among a cross-section of 1379 patients in 45 facilities in Beijing, Guangzhou and Shanghai. Data from China were compared with a cross section of 11 054 patients from the core DOPPS countries (collected 2009-11). Among China DOPPS patients, logistic and linear regression were used to describe the association of dialysis frequency with patient and treatment characteristics and quality of life. A total of 26% of the patients in China were dialyzing two times weekly, compared with < 5% in other DOPPS regions. Standardized Kt/V was lowest in China (2.01) compared with other regions (2.12-2.27). Female sex, shorter dialysis vintage, lower socioeconomic status, less health insurance coverage, and lack of diabetes and hypertension were associated with dialyzing two times weekly (versus three times weekly). Patients dialyzing two times per week had longer treatment times and lower standardized Kt/V, but similar quality of life scores. Two-times weekly dialysis is common in China, particularly among patients, who started dialysis more recently, have a lower comorbidity burden and have financial constraints. Quality of life scores do not differ between the two-times and three-times weekly groups.

Lucas MF et al 2014 [20] evaluated a progressive schedule of dose of dialysis, starting with 2 HD/week, when the renal clearance of urea was equal to or greater than 2,5 mL/min/1,73 m2 and the patient is in a stable clinical situation. From 2006 to 2011, 182 patients started hemodialysis in the center, of which 134 were included in the study.

Residual renal function (RRF), Kt/V, eKru, nPCR, hemoglobin, weekly erythropoietin dose, and beta-2-microglobulin were determined at 6, 12, 18, 24, and 30 months after dialysis initiation. Seventy patients (52%) began with the progressive schedule of 2 HD/week and 64 (48%) patients began with the conventional thrice-weekly schedule (3 HD/week). The decline of RRF was lower in the group of 2 HD/week: 0,20 (0,02–0,53) versus 0,50 (0,14–1,08) mL/min/month (median and interquartile range,). No relationship was found between the decline rate and the basal RRF. Survival analysis did not show differences between both groups. The experience demonstrates that patients with higher residual renal function may require less than conventional 3 HD sessions per week at the start of dialysis. Twice-weekly hemodialysis schedule is safe and cost-effective and may have additional benefit in maintaining the residual renal function.

Kalantar-Zadeh K et al 2014 [21] reviewed the concept of incremental HD, in which weekly dialysis dose, in particular HD treatment frequency, is based on a variety of clinical factors, such as RKF (including urine output > 0.5 L/d), volume status, cardiovascular symptoms, body size, potassium and phosphorus levels, nutritional status, hemoglobin level, comorbid conditions, hospitalizations, and health-related quality of life. These 10 clinical criteria may identify which patients might benefit from beginning maintenance HD therapy twice weekly. Periodic monitoring of these criteria will determine the timing for increasing dialysis dose and frequency. They recognize that twice-weekly HD represents a major paradigm shift for many clinicians and jurisdictions. Therefore, they propose conducting randomized controlled trials of twice-weekly versus thrice-weekly HD to assess the potential of twice-weekly HD to improve survival and health-related quality of life while simultaneously reducing costs, protecting fragile vascular accesses, and optimizing resource use during the first year of hemodialysis therapy. Such incremental and individualized HD therapy may prove to be the most appropriate approach for transitioning to dialytic therapy.

Zhang M et al 2014 [22] hypothesized that initial twice-weekly HD helps in maintaining a longer RKF. In a dialysis center in Shanghai, 168 ESRD patients were screened and finally 85 patients were identified for this main cohort study. They first examined these 85 MHD patients; 30 of them were initiated with twice-weekly HD for 6 months or longer and 55 patients were started and maintained on thrice-weekly HD treatment. Then a subcohort study in 48 incident MHD patients was implemented to assess the independent risk factors responsible for RKF decline during the first year of HD therapy. Multivariate logistic regression analysis was then employed to examine the odds ratio of RKF loss. The main cohort study showed that the clinical outcomes were almost the same between the two groups in 85 patients, but the percent of patients with RKF loss was significantly lower in the twice-weekly group compared with the thrice-weekly group, especially during the first year of HD initiation. In the 48 incident MHD patients, they found no significant differences between the two groups except for variations in the HD frequency, weekly Kt/V. The multivariate analysis showed that factors such as the male gender, HD frequency, URR and intradialytic hypotension episode were associated with RKF loss, and the odds ratio of RKF loss for each additional HD treatment per week was 7.2. Twice-weekly HD during the first year of dialysis therapy appears to be associated with better RKF preservation.

Wong J et al 2015 [23] reviewed about incremental hemodialysis. Thrice-weekly haemodialysis schedules have become the standard default haemodialysis prescription worldwide. Whereas the measurement of residual renal function is accepted practice for peritoneal dialysis patients and the importance of residual renal function in determining technique success is well established, few centres routinely assess residual renal function in haemodialysis patients. Although intradialytic hypotension and episodes of acute kidney injury may predispose to an earlier loss of residual renal function, a significant proportion of haemodialysis patients maintain some residual function long after dialysis initiation. As such, an incremental approach to the initiation of

dialysis with careful monitoring of residual renal function may potentially provide some haemodialysis patients with an improved quality of life and greater preservation of residual renal function whilst fewer dialysis sessions may reduce health care costs. Prospective trials are required to determine the optimum approach to the initiation of haemodialysis for the oliguric patient. Once residual renal function has been lost, then dialysis prescriptions should be re-examined to consider the use of longer or more frequent treatment sessions and switching from low-flux to high-flux dialysis or haemodiafiltration to offset retention of middle sized molecules and protein-bound azotaemic solutes.

Obi Y et al 2016 [24] hypothesized that a less frequent schedule at hemodialysis therapy initiation is associated with greater preservation of RKF without compromising survival among patients with substantial RKF. 23,645 patients who initiated maintenance hemodialysis therapy in a large dialysis organization in the United States (January 2007 to December 2010), had available RKF data during the first 91 days (or quarter) of dialysis, and survived the first year. Among 23,645 included patients, 51% had substantial renal urea clearance (≥3.0 mL/min/1.73 m2) at baseline. Compared with 8,068 patients with conventional hemodialysis regimens matched based on baseline renal urea clearance, urine volume, age, sex, diabetes, and central venous catheter use, 351 patients with incremental regimens exhibited 16% (95% CI, 5%-28%) and 15% (95% CI, 2%-30%) more preserved renal urea clearance and urine volume at the second quarter, respectively, which persisted across the following quarters. Incremental regimens showed higher mortality risk in patients with inadequate baseline renal urea clearance (≤3.0 mL/min/1.73 m2; HR, 1.61; 95% CI, 1.07-2.44), but not in those with higher baseline renal urea clearance (HR, 0.99; 95% CI, 0.76-1.28). Results were similar in a subgroup defined by baseline urine volume of 600 mL/d. Among incident hemodialysis patients with substantial RKF, incremental hemodialysis may be a safe treatment regimen and is associated with greater preservation of RKF,

whereas higher mortality is observed after the first year of dialysis in those with the lowest RKF.

Merino JL et al 2017 [25] included incident patients with residual diuresis >1000ml/24h, clinical stability, absence of edema, absence of hyperkalaemia >6.5mEq/l and phosphoremia >6mg/dl, with acceptable comprehension of dietetic care. Exclusion criteria were: clinical instability, no dietary or medical compliance and the afore mentioned laboratory abnormalities. A total of 24 patients were included in incremental technique. The mean age at start of RRT was 60±15 years. The average time on incremental technique was 19±18 months (range: 7–80), with a mean time on dialysis of 31±23 months (range: 12–86). The reasons for transfer to thrice-weekly HD were: in 6 patients due to laboratory tests, in 2 patients for heart failure events, one for poor compliance and 3 for receiving a kidney graft. The residual diuresis decreased in the first year from 2106±606ml/day to 1545±558 (p=.17) with the urea clearance and calculated residual renal function, basal 5.7±1.5 vs 3.8±1.9ml/min per year (p=.01) and basal 8.9±2.4 vs 6.9±4.3 per year (p=.28), respectively. Incremental HD treatment, with twice-weekly HD, may be an alternative in selected patients. This approach can largely preserve residual renal function at least for the first year.

Park JI et al 2017 [26] analyzed 927 patients with newly initiated HD from the Clinical Research Center for End-Stage Renal Disease cohort from 2008 to 2014. The patients were classified into a thrice-weekly initiation group or an incremental initiation group (one to two sessions per week) according to the frequency of HD per week at baseline. They compared health-related quality of life (HRQOL), daily urine volume at 12 months and all-cause mortality between the groups. A total of 312 patients (207 in the thrice-weekly group and 105 in the incremental group) were selected. All-cause mortality was comparable between the two groups before and after propensity score matching. The HRQOL tended to be better in the incremental group for the majority of domains

of the Kidney Disease Quality of Life Short Form and Beck's Depression Inventory; however, only the symptoms and problems domain was significantly better in the incremental group at 3 months after HD. At 12 months after HD, there were no differences between the groups. The daily urine volume at 12 months after HD was similar between the two groups. Incremental HD initiation showed comparable results to thrice-weekly initiation for HRQOL, residual renal function and all-cause mortality. Incremental HD may be considered an additional option for HD initiation in selected patients.

Mathew AT et al 2018 [27] reviewed the results of 12 observational cohort studies of twice-weekly compared to thrice-weekly HD. Incremental HD is associated with several benefits including preservation of RKF as well as extending the event-free life of arteriovenous fistulas and grafts. Patient survival and quality of life, however, has been variably associated with incremental HD. Serious risks must also be considered, including increased hospitalization and mortality perhaps related to fluid and electrolyte shifts after a long interdialytic interval. On the basis of the above literature review, and our clinical experience, they suggest patient characteristics which may predict favorable outcomes with an incremental approach to HD. These include substantial RKF, adequate volume control, lack of significant anemia/electrolyte imbalance, satisfactory health-related quality of life, low comorbid disease burden, and good nutritional status without evidence of hypercatabolism. Clinicians should engage patients in on-going conversations to prepare for incremental HD initiation and to ensure a smooth transition to thrice-weekly HD when needed.

Wolley MJ et al 2019 [28] reported prevalence and outcomes of incremental dialysis in Australia and New Zealand. The cohort was all adults starting renal replacement therapy with HD in Australia and New Zealand 2004–2015. They used cox proportional hazards modelling with a primary exposure of dialysis frequency at first survey date (≥ or <3 times per week). The primary outcome was all-cause mortality (primary), cardiovascular and non-cardiovascular mortality (secondary). Eight-hundred fifty of 27 513 subjects were started on twice weekly HD

(prevalence 3%). Compared to conventional patients, incremental dialysis patients were older (67 vs 62 years, P < 0.001), had a lower body mass index (26.1 vs 27.7 kg/m2, P < 0.001), had a higher starting estimated glomerular filtration rate (7.59 vs 6.66 mL/min P < 0.001) and had less diabetes (39.2% vs 50.2%, P < 0.001). In a multivariate model, incremental start dialysis was not associated with all-cause mortality (hazard ratio (HR) = 1.03, 95% confidence interval (CI) = 0.92–1.16) or cardiovascular mortality (HR = 0.87, 95% CI = 0.71–1.07), but was associated with an increased risk of non-cardiovascular mortality (HR = 1.25, 95% CI = 1.11–1.42). Incremental dialysis was used infrequently, and there was evidence of patient level differences. All-cause mortality was similar, but there were differences in cause specific mortality.

Liu Y et al 2019 [29] conducted a meta-analysis to evaluate the benefits and limitations of incremental HD regimen in patients with end-stage renal disease. They searched PubMed, Embase, and the Cochrane Central Register databases for controlled trials published until January 2017. Outcomes of interest included baseline patient characteristics, mortality risk, renal function, urine volume, laboratory values, and hospitalization rate. Overall, 16 studies (n = 252 330), including 15 observational studies and 1 cross-sectional study, were included. Incremental HD reduced mortality risk, compared with conventional HD (risk ratio [RR], 0.797; 95% confidence interval [CI], 0.731–0.870; P < 0.001; I2 = 0%). Renal function (standardized mean difference [SMD] = 0.677, 95% CI: 0.035 to 1.318, P = 0.039; I2 = 92.7%) and urine volume (weighted mean difference [WMD] = 333.37, 95% CI: 86.81 to 579.93, P = 0.008; I2 = 92.7%) were also better preserved in patients on incremental HD. An incremental therapeutic approach as a beginning haemodialysis regimen is associated with lower mortality and better preservation of greater residual renal function.

Garofalo C et al 2019 [30] compared all-cause mortality and residual kidney function (RKF) loss in incremental and full-dose dialysis and time to full-dose dialysis in incremental hemodialysis (IHD) and

incremental peritoneal dialysis (IPD). They performed a systematic review and meta-analysis of cohort studies of adults with ESRD starting IHD and IPD. They identified in PubMed and Web of Science database all cohort studies evaluating incremental dialysis evaluating three outcomes: all-cause mortality, RKF loss, time to full dialysis. IPD was defined as < 3 daily dwells in Continuous Ambulatory Peritoneal Dialysis and < 5 sessions per week in Automated Peritoneal Dialysis, while IHD was defined as < 3 HD sessions per week. 22 studies (75,292 participants), 15 in HD and 7 in PD, were analyzed. Mean age at dialysis start was 62 and 57 years in IHD and IPD subjects, respectively. When compared to full dose, incremental dialysis (IHD or IPD) had an overall mortality risk of 1.14 [95% CI 0.85–1.52] with high heterogeneity among studies (I2 86%, P < 0.001), and lower mean RKF loss (− 0.58 ml/min/months, 95% CI 0.16–1.01, P = 0.007). Incremental dialysis allows longer preservation of RKF thus deferring full-dose dialysis, by about 1 year in HD and PD, with no increase in mortality risk.

Deira J et al 2019 [31] determined if start HD with one sessions per week (1-Wk/HD), it is associated with better patient survival and other safety parameters. IHDIP is a multicenter RCT experimental open trial. It is randomized in a 1:1 ratio and controlled through usual clinical practice, with a low intervention level and non-commercial. It includes 152 incident patients older than 18 years, with a RRF of ≥4 ml/min/1.73 m2, measured by renal clearance of urea (KrU). The intervention group includes 76 patients who will start with incremental HD (1-Wk/HD). The control group includes 76 patients who will start with thrice-weekly hemodialysis régimen. The primary outcome is assessing the survival rate, while the secondary outcomes are the morbidity rate, the clinical parameters, the quality of life and the efficiency.

Lee Y et al 2019 [32] compared the outcomes of incremental PD and full-dose PD in terms of RRF preservation and other outcomes. This was a single-center, observational study. Data were extracted retrospectively from a cohort of incident PD patients over 16 years old

who started PD between 2007 and 2015 in the PD Unit of Seoul National University Hospital. They used inverse probability weighting (IPW) adjustment based on propensity scores to balance covariates between the incremental and full-dose PD groups. Multivariate, time-dependent Cox analyses were performed. Among 347 incident PD patients, 176 underwent incremental PD and 171 underwent conventional full-dose PD. After IPW adjustment, the incremental PD group exhibited a lower risk of developing anuria (hazard ratio [HR] 0.61, 95% confidence interval [CI] 0.43–0.88). Patient survival, technique survival, and peritonitis-free survival were all similar between these groups ($P > 0.05$ by log-rank test). Incremental PD was beneficial for preserving RRF and showed similar patient survival when compared to conventional full-dose PD.

Murea M et al 2020 [33] discussed potential benefits of and barriers to alternative dialysis regimens in patients with incident ESKD, with emphasis on twice-weekly HD with pharmacologic therapy, and summarizes in-progress clinical trials of incremental HD schedules. The prescription of hemodialysis (HD) in patients with incident end-stage kidney disease (ESKD) is fundamentally empirical. The abrupt transition from nondialysis chronic kidney disease (CKD) to thrice-weekly in-center HD of much the same dialysis intensity as in those with prevalent ESKD underappreciates the progressive nature of kidney disease whereby the decline in renal function has been gradual and ongoing—including at the time of HD initiation. Adjuvant pharmacologic treatment (i.e., diuretics, acid buffers, potassium binders), coupled with residual kidney function (RKF), can complement an initial HD regimen of lower intensity. Barriers to less intensive HD in incident ESKD include risk of inadequate clearance of uremic toxins due to variable and unexpected loss of RKF, lack of patient adherence to assessments of RKF or adjustment of HD intensity, increased burden for all stakeholders in the dialysis units, and negative financial repercussions. A stepped dialysis regimen with scheduled transition from time-delineated twice-weekly HD to thrice-weekly HD could

represent an effective and safe strategy to standardize incremental HD in patients with CKD transitioning to early-stage ESKD. Patients' adherence and survival as well as other clinical outcomes should be rigorously evaluated in clinical trials before large-scale implementation of different incremental schedules of HD.

Chen W et al 2021 [34] conducted a comprehensive analysis by investigating whether incremental hemodialysis was simultaneously associated with adequate dialysis therapy, stable complication indicators, long-lasting arteriovenous vascular access, and long-lasting preservation of residual kidney function (RKF) without increasing mortality or hospitalization. Incident hemodialysis patients from Huashan Hospital in Shanghai, China, over the period of 2012 to 2019, were enrolled and followed every three months until death or the time of censoring. Changes in complication indicators from baseline to all post-baseline visits were analyzed by mixed-effects models. The outcomes of RKF loss, arteriovenous vascular access complications, and the composite of all-cause mortality and cardiovascular events were compared between incremental and conventional hemodialysis by Cox proportional hazards model. Of the 113 patients enrolled in the study, 45 underwent incremental and 68 conventional hemodialysis. There were no significant differences in the changes from baseline to post-baseline visits in complication indicators between the two groups. Incremental hemodialysis reduced the risks of RKF loss (HR, 0.33; 95% CI, 0.14–0.82), de novo arteriovenous access complication (HR, 0.26; 95% CI, 0.08–0.82), and recurrent arteriovenous access complications under the Andersen–Gill (AG) model (HR, 0.27; 95% CI, 0.10–0.74) and the Prentice, Williams and Peterson Total Time (PWP-TT) model (HR, 0.31; 95% CI, 0.12–0.80). There were no significant differences in all-cause hospitalization or the composite outcome between groups. Incremental hemodialysis is an effective dialysis transition strategy that preserves RKF and arteriovenous access without affecting dialysis adequacy, patient stability, hospitalization risk and mortality risk.

Hazara AM et al 2021 [35] enrolled 20 patients who will commence HD twice-weekly with progressive increases in duration and frequency, achieving conventional treatment times over 15 weeks (incremental group). Participants will be followed-up for 6 months and will undergo regular tests including urine collections, bio-impedance analyses and quality-of-life questionnaires. Semi-structured interviews will be conducted to explore patients' prior expectations from HD, their motivations for participation and experiences of receiving incremental HD. For comparison of safety and indicators of dialysis adequacy, a cohort of 40 matched patients who previously received conventional HD was constructed from local dialysis records (historical controls). Data was recorded on the numbers screened and proportions consented and completing the study (primary outcome). Incremental and conventional groups will be compared in terms of differences in blood pressure control, interdialytic weight changes, indicators of dialysis adequacy and differences in adverse and serious adverse events. In analyses restricted to incremental group, measurements of RRF, fluid load and quality-of-life during follow-up will be compared with baseline values. From patient interviews, a narrative description of key themes along with anonymised quotes was presented.

Mendonca S et al 2021[36] presented a 3-year follow-up of patients on twice-weekly dialysis and their outcomes. This was a 3-year observational follow-up study of patients initiated on twice-weekly hemodialysis. Adequacy and basic cost-effective hematological and biochemical parameters were studied monthly. In case of complications, the patient was shifted to thrice-weekly hemodialysis. 88 incident hemodialysis patients were followed up. Total sessions of hemodialysis (HD) studied were 16,406. The mean hemoglobin level was 9.53 g/dl with hyperphosphatemia in 74.88% patients. The mean residual renal function (RRF) at initiation was 5.71 +/- 3.70 ml/min. The mean interdialytic weight gain was 1.91 +/- 1.26 kg with a mean ultrafiltration of 2600 ± 410 ml. nitiation at twice-weekly schedules for patients on maintenance hemodialysis is a viable option with

increments in case of requirement, more so in patients with good urine output and residual renal function. The biochemical and hematological parameters were stable and within KDOQI guidelines and do not worsen with time.

Caton E et al 2022 [37] searched MEDLINE, EMBASE, CINAHL and the Cochrane Library databases from inception to 27 February 2022. Eligible studies compared incremental haemodialysis (sessions either fewer than three times weekly or of duration <3.5 h) with standard treatment. The primary outcome was mortality. Secondary outcomes included treatment-emergent adverse events, loss of RKF, quality of life and cost effectiveness. A total of 644 records were identified. Twenty-six met the inclusion criteria, including 22 cohort studies and two randomized controlled trials (RCTs). Sample size ranged from 48 to 50 596 participants (total 101 476). They found no mortality differences (hazard ratio = 0.99; 95% CI 0.80–1.24). Cohort studies suggested similar hospitalization rates though the two small RCTs suggested less hospitalization after incremental initiation (relative risk = 0.31; 95% CI 0.18–0.54). Data on other treatment-emergent adverse events and quality of life was limited. Observational studies suggested reduced loss of RKF in incremental haemodialysis. This was not supported by RCT data. Four studies reported reduced costs of incremental treatments. Incremental initiation of haemodialysis does not confer greater risk of mortality compared with standard treatment. Hospitalization may be reduced and costs are lower.

Yan H et al 2022 [38] investigated the characteristics and outcomes of the end-stage kidney disease (ESKD) patients treated with incremental peritoneal dialysis (PD) at a large academic centre. One hundred and seventy-five patients were included and were followed up for 352.6 patient-years. The baseline residual kidney function (RKF) was 8.3 ± 3.4 mL/min/1.73 m2. The unadjusted 1- to 5-year patient survival rate was 89.6%, 80.4%, 65.4%, 62.7% and 48.8%, respectively, and the corresponding time on PD therapy rate was 95.1%, 89.1%, 89.1%, 82.4% and 77.6%. Greater initial PD dose (hazard ratio = 1.608, 95%

confidence interval 1.089–2.375) was associated with death after adjusting for age, Charlson comorbidity index (CCI), haemodialysis prior to PD, assisted PD and baseline RKF, likely as a result of residual confounding. There was no association with PD discontinuation. The average peritonitis rate and hospitalisation rate were 0.122 and 0.645 episodes per patient-year, respectively. The dialysate volume increased from 4.5 (4.3–5.7) L/day to 8.0 (6.0–9.8) L/day at 5 years. Fifty-seven (32.6%) patients graduated to full-dose PD at a median time of 10.3 (6.2, 15.7) months. Male sex, greater body mass index and lower baseline serum albumin were risk factors for increasing PD dose to over 6 L/day within 1 year. Incremental PD is a safe approach to initiate dialysis, and it offers satisfactory outcomes. Close monitoring, comprehensive evaluation of clinical responses and prompt adjustment of the prescription as needed play a crucial role in this patient-centred treatment.

Vilar E et al 2022 [39] initiated a randomized controlled feasibility trial examining 55 incident hemodialysis patients with urea clearance of 3 ml/min/1.73 m2 or more across four centers in the United Kingdom randomized to standard or incremental schedules for 12 months. Incremental hemodialysis involved twice-weekly sessions, upwardly adjusting hemodialysis dose as RKF was lost, maintaining total (Dialysis+Renal) Std Kt/V above 2. Standard hemodialysis was thrice weekly for 3.5-4 hours, minimum Dialysis Std Kt/V of 2. Primary outcomes were feasibility parameters and effect size of group differences in rate of loss of RKF at six months. Health care cost impact and patient-reported outcomes were explored. Around one-third of patients met eligibility criteria. Half agreed to randomization; 26 received standard hemodialysis and 29 incremental. At 12 months, 21 incremental patients remained in the study vs 12 in the standard arm with no group differences in the urea clearance slope. Ninety-two percent of incremental and 75% of standard arm patients had a urea clearance of 2 ml/min/1.73 m2 or more at six months. Serious adverse events were less frequent in incremental patients (Incidence Rate Ratio

0.47, confidence interval 0.27-0.81). Serum bicarbonate was significantly lower in incremental patients indicating supplementation may be required. There were three deaths in each arm. Blood pressure, extracellular fluid and patient-reported outcomes were similar. There was no signal of benefit of incremental hemodialysis in terms of protection of RKF or Quality of Life score. Median incremental hemodialysis costs were significantly lower compared to standard hemodialysis. Thus, incremental hemodialysis appears safe and cost-saving in incident patients with adequate RKF, justifying a definitive trial.

MATERIAL AND METHODS

The patients with ESRD being initiated on maintenance hemodialysis in the Dialysis Unit, department of nephrology, Dayanand Medical College and hospital Ludhiana, were included in the study.

Study Design:

Observational prospective cohort study

Source of Data

The patients initiated on maintenance hemodialysis from August 2021 to May 2022 were included in the study and followed up for 6 months.

Inclusion criteria

1. Patients being initiated for maintenance hemodialysis
2. Age >18 years and <65 years, either gender

Exclusion criteria

1.Patients with acute on chronic kidney disease

2.Patients on continuous ambulatory peritoneal dialysis

3.Patients being worked up for renal transplant

4.Pregnancy

5.Having active malignancy with very short life expectancies

6.Chronic debilitating diseases with short life expectancies

7.Patients not consenting for inclusion in the study.

Methods of collection of Data

After a written informed consent, patient's detailed history, physical examination and investigations were recorded as per the predefined and well-structured proforma attached in appendix. Demographic details including name, age, gender, address, contact details were taken. History of present illness were recorded including native disease and total duration of disease. Detailed general physical examination

and systemic examination of respiratory, cardiovascular, central nervous system, vascular access for hemodialysis were done. Laboratory parameters, including hemoglobin, total protein, albumin, serum calcium, serum phosphorus, intact parathyroid hormone (iPTH), vitamin-D, alkaline phosphatase, were recorded . Laboratory parameters were compared at baseline, monthly or three monthly as per KDIGO guidelines for CKD patients.

Residual kidney function were calculated at the initiation, at the end of 3 months and 6 months. It was calculated after 12 hour collection of urine prior to hemodialysis, through the mean of creatinine clearance rate and urea clearance rate. Creatinine clearance was calculated by Ucr × V/ Pcr. Where, Ucr is concentration of creatinine in urine, V is urine flow rate and Pcr is plasma creatinine concentration, and urea clearance will be calculated by Uur×V/Pur, where Uur is concentration of urea in urine, V is urine flow rate and Pur is concentration of urea in plasma.

The transition from incremental hemodialysis to more frequent hemodialysis done, when, clinically indicated.

Outcome were studied at 6 months.

Primary outcomes studied:

All cause mortality

Secondary outcomes studied:

Residual renal function, Quality of life (QoL) index (based on WHOQOL-BREF score), Incidence of transition to more frequent hemodialysis, any morbidity including number of hospitalization episodes.

STATISTICAL ANALYSIS

Data was described in terms of range; mean ±standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. Paired t test was performed to compare the outcomes. For comparing categorical data, Chi square ($\chi 2$) test was performed. A probability value (p value) less than 0.05 was considered statistically significant. All statistical calculations were done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

OBSERVATION & RESULTS

Table 1: Hemodialysis group

Incremental/Regular	No. of cases	Percentage
Incremental	36	52.9%
Regular	32	47.1%
Total	68	100.0%

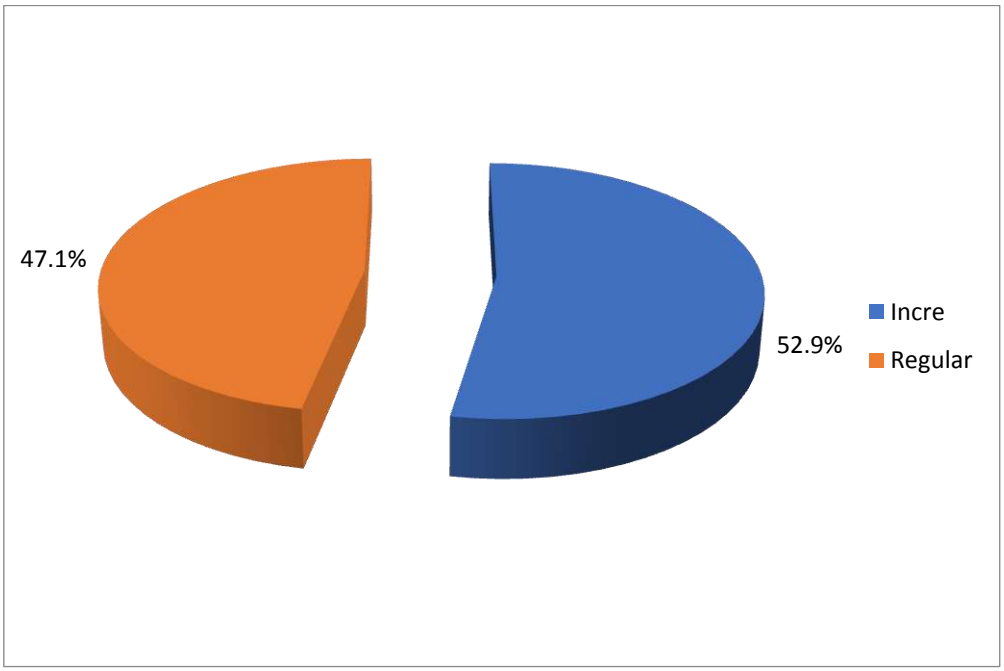

Figure 1: Hemodialysis group

In this prospective cohort study, we enrolled 71 patients, initiated on maintenance hemodialysis from August 2021 to May 2022. Out of these, 68 patients were followed up for 6 months, 3 patients were lost to follow up. Out of 68 patients, 32 patients (47.1%) were initiated on regular twice weekly hemodialysis and 36 patients (52.9%) were initiated on incremental hemodialysis. Later, 7 patients from regular twice hemodialysis group transitioned to thrice weekly hemodialysis, considered among incremental hemodialysis. At the end of study, 43 patients were considered in incremental hemodialysis group and 25 patients were in regular twice weekly hemodialysis group.

Table 2: Mean Age

	Incremental		Regular		Z	p-value
	Mean	SD	Mean	SD		
AGE	52.09	11.92	50.92	11.69	0.394	0.695

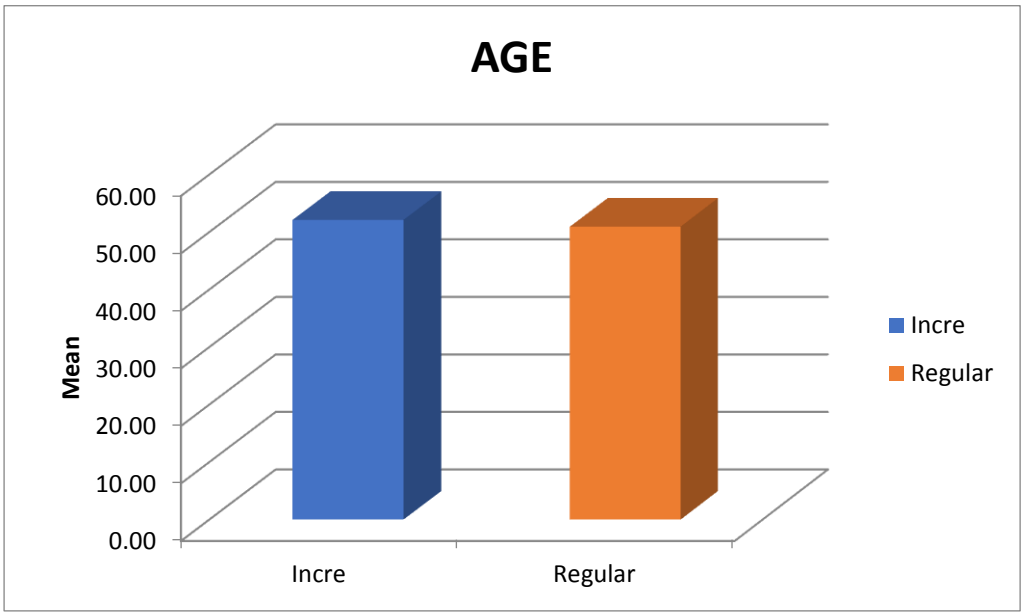

Figure 2: Mean age

The mean age of the total cohort was 51.65 years. The mean age of the patients in incremental group was 52.09 years and that of regular twice weekly hemodialysis group was 50.92 years. The difference was statistically insignificant (p=0.695).

Table 3: Age Distribution

		Incremental		Regular		Total	Chi-square value	p-value
	years	No. of cases	%age	No. of cases	%age			
Age group	< 30	5	11.6%	2	8.0%	7	1.878	0.758
	31-40	1	2.3%	2	8.0%	3		
	41-50	8	18.6%	5	20.0%	13		
	51-60	15	34.9%	10	40.0%	25		
	> 60	14	32.6%	6	24.0%	20		
Total		43	100.0%	25	100.0%	68		

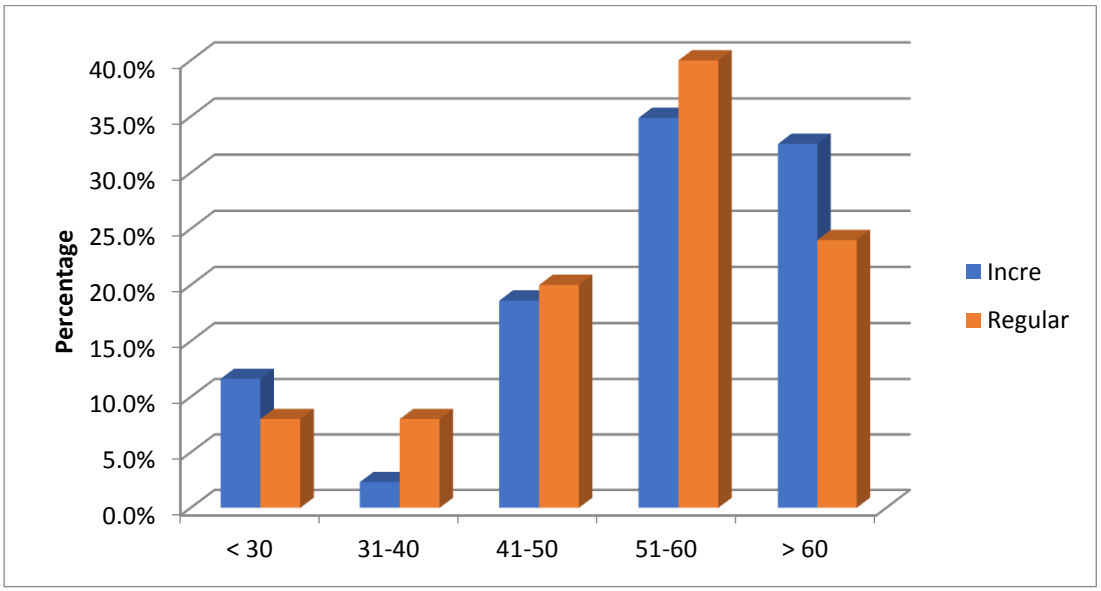

Figure 3: Age Distribution

In both the groups, the majority of patients were older than 50 years, followed by 41 - 50 years of age. In both the incremental hemodialysis group and the regular twice weekly hemodialysis group, the smallest number of patients were observed below 40 years of age.

Table 4: Gender distribution

		Incremental		Regular		Total	Chi-square value	p-value
		No.	%age	No.	%age			
Gender	Female	10	23.3%	6	24.0%	16	0.005	0.944
	Male	33	76.7%	19	76.0%	52		
Total		43	100.0%	25	100.0%	68		

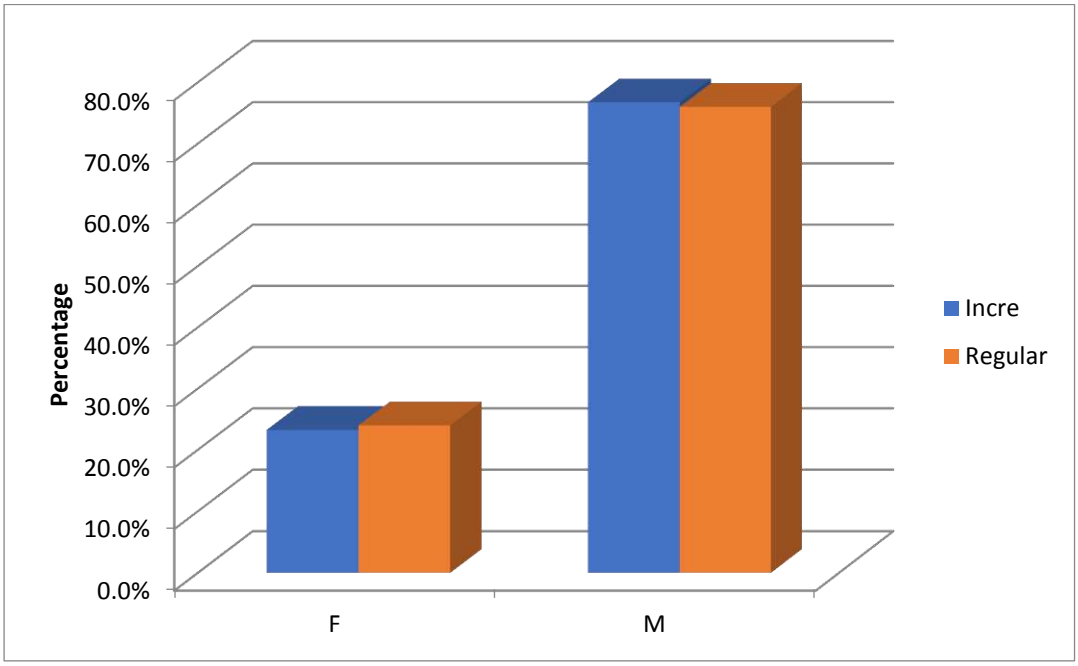

Figure 4: Gender distribution

Among incremental hemodialysis group 10 patients (23.3%) were female and 33 patients (76.7%) were male. Among regular twice weekly hemodialysis group 6 patients (24.0%) were female and 19 (76%) were male. Difference was not significant with p-value 0.944.

Table 5: Body mass index (kg/m^2)

		Incremental		Regular		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
BMI (GROUP)	< 18.5	5	11.6%	3	12.0%	8	2.296	0.513
	18.5-24.9	28	65.1%	12	48.0%	40		
	25-29.9	8	18.6%	8	32.0%	16		
	> 30	2	4.7%	2	8.0%	4		
Total		43	100.0%	25	100.0%	68		

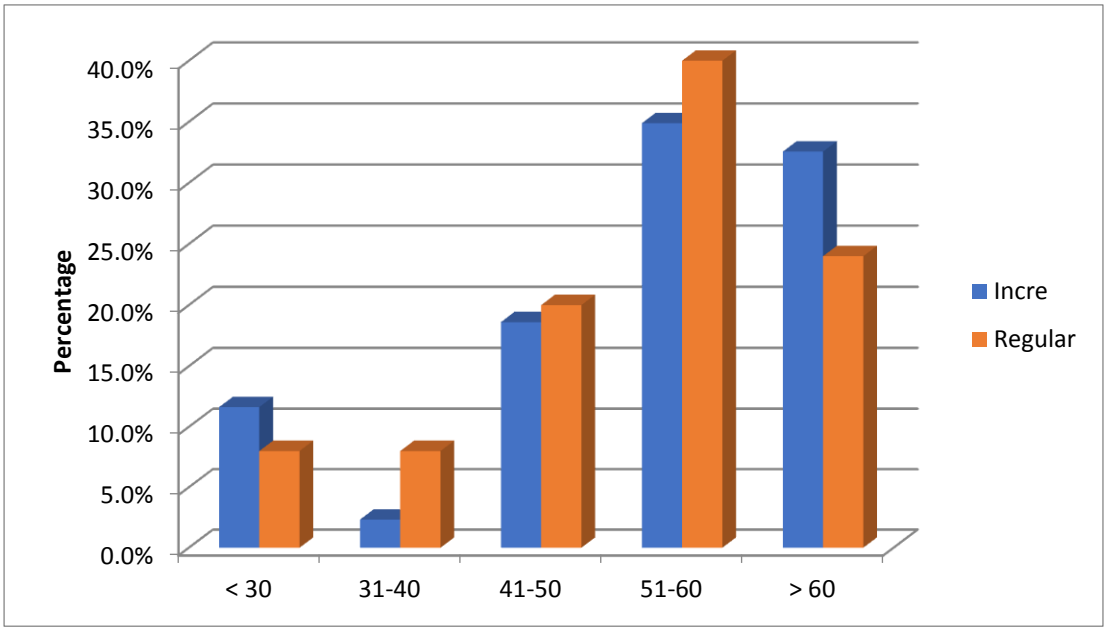

Figure 5: Body mass index (kg/m^2)

In this study, 2 patients (4.7%) in incremental hemodialysis and 2 patients (8%) in regular hemodialysis group were obese with BMI >30 kg/m^2. 5 patients (11.6%) in incremental group and 3 patients (12%) in regular group were underweight with BMI <18.5 kg/m^2. 28 patients (65.1%) and 12 patients (48%) were within normal weight category in incremental hemodialysis group and regular twice weekly hemodialysis respectively with BMI 18.5-24.9 kg/m2. Whereas 8 patients (18.6%) in incremental group and 8 patients (32%) were overweight with BMI 25 – 29.9 kg/m2. The difference was not statistically significant (p=0.513).

Table 6: Underlying disease for ESRD

		Incremental		Regular		Total	Chi-square value	p-value
		No.	%	No.	%			
Underlying disease	ADPKD	1	2.3%	1	4.0%	2	4.179	0.652
	CGN	5	11.6%	1	4.0%	6		
	CHRONIC ANALGESIC ABUSE	1	2.3%	0	0.0%	1		
	DM2	22	51.2%	12	48.0%	34		
	HTN	12	27.9%	11	44.0%	23		
	RENAL CALCULUS DISEASE (OBSTRUCTIVE NEPHROPATHY)	1	2.3%	0	0.0%	1		
	RENAL CORTICAL NECROSIS	1	2.3%	0	0.0%	1		
Total		43	100.0%	25	100.0%	68		

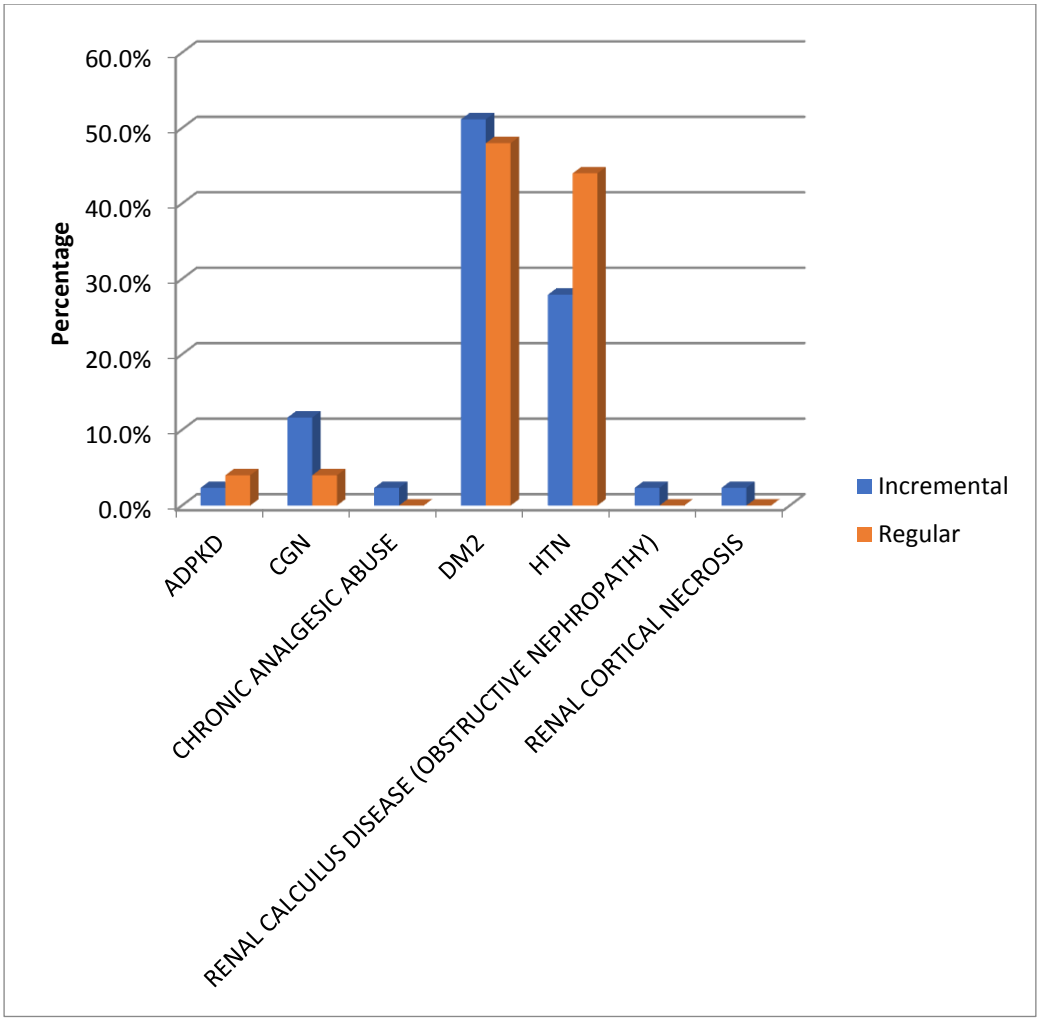

Figure 6: Underlying disease for ESRD

In the study, it was observed that diabetes mellitus type 2 was the predominant underlying disease leading to end-stage renal disease (ESRD) in both the incremental group and regular twice weekly hemodialysis group, with 22 patients (51.2%), and the regular group, with 12 patients (48%). Hypertension emerged as the second most common cause in both groups. Additionally, other factors contributing to ESRD included ADPKD, CGN, chronic analgesic abuse, obstructive nephropathy, and renal cortical necrosis. Notably, statistical analysis revealed that the observed differences between the two groups were statistically insignificant, as indicated by a p-value of 0.652.

Table 7: Co-morbidities

Co-morbidities	No. of cases	Percentage
CAD	1	1.5%
CLD	3	4.4%
HYPOTHYROIDISM	1	1.5%
MORBID OBESITY	4	5.9%
BPH	1	1.5%

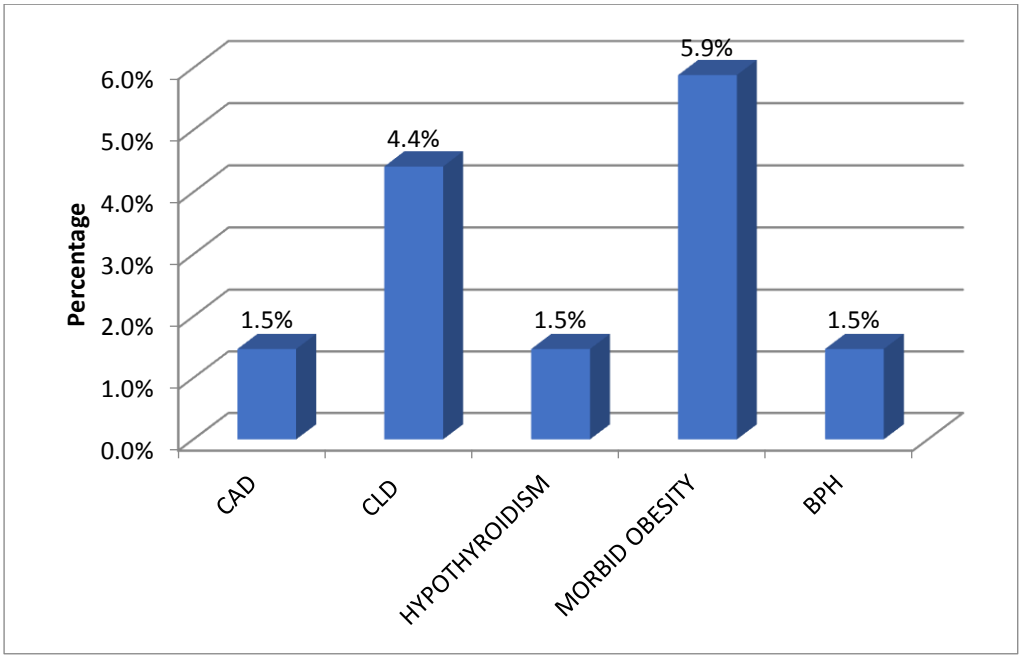

Figure 7: Co-morbidities

Co-morbidities: 4 patients (5.8%) were morbid obese, 3 patients (4.4%) had chronic liver disease, 2 patients (2.9%) had hypothyroidism and 1 patient (1.5%) had coronary artery disease with a history of PTCA.

Table 8: Transition to more frequent hemodialysis

transition to more frequent hemodialysis	No. of cases	Percentage
No	10	23.8%
Yes	32	76.1%
Total	42	100%

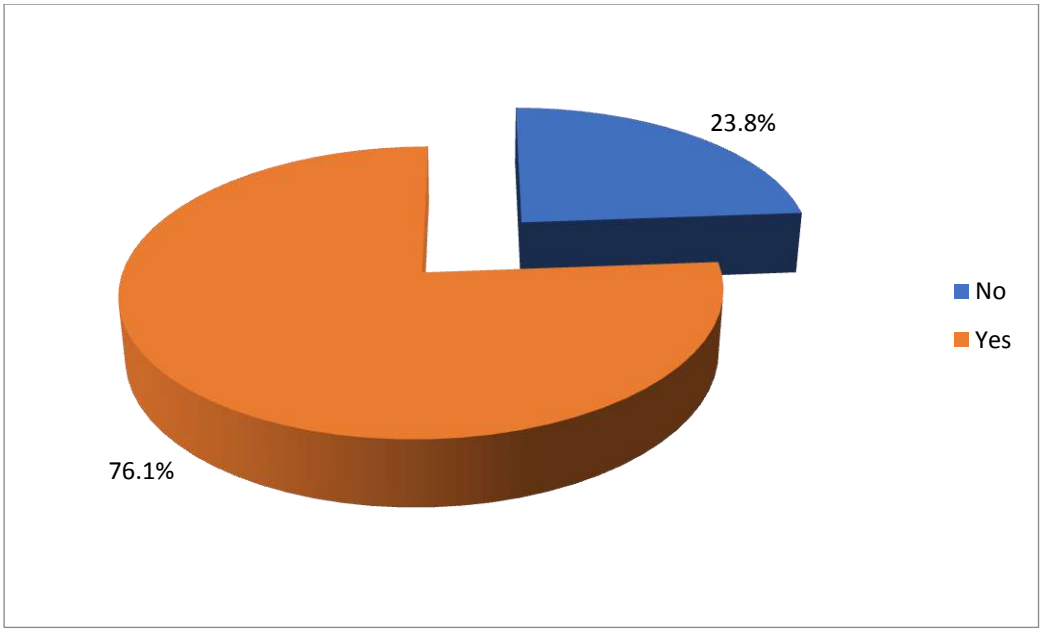

Figure 8: Transition to more frequent hemodialysis

It was observed that among incremental hemodialysis group of 42 patients, 32 patients (76.1%) transitioned for more frequent hemodialysis. Whereas, 10 patients (23.8%) did not require more frequent hemodialysis

Table 9: Trend of transition to more frequent hemodialysis

Trend of transition to more frequent hemodialysis	No. of cases	Percentage
From once in 2 weeks to once in 10 days	2	2.9%
From once in 2 weeks to once a week	3	4.4%
once in 10 days to once a week	7	10.3%
From once in 10 days to twice a week	1	1.5%
once in 10 days	2	2.9%
Once in 5 days to twice a week	1	1.5%
once a week	6	8.8%
once a week to twice a week	14	20.6%
Twice a week to thrice a week	7	10.3%
total	43	

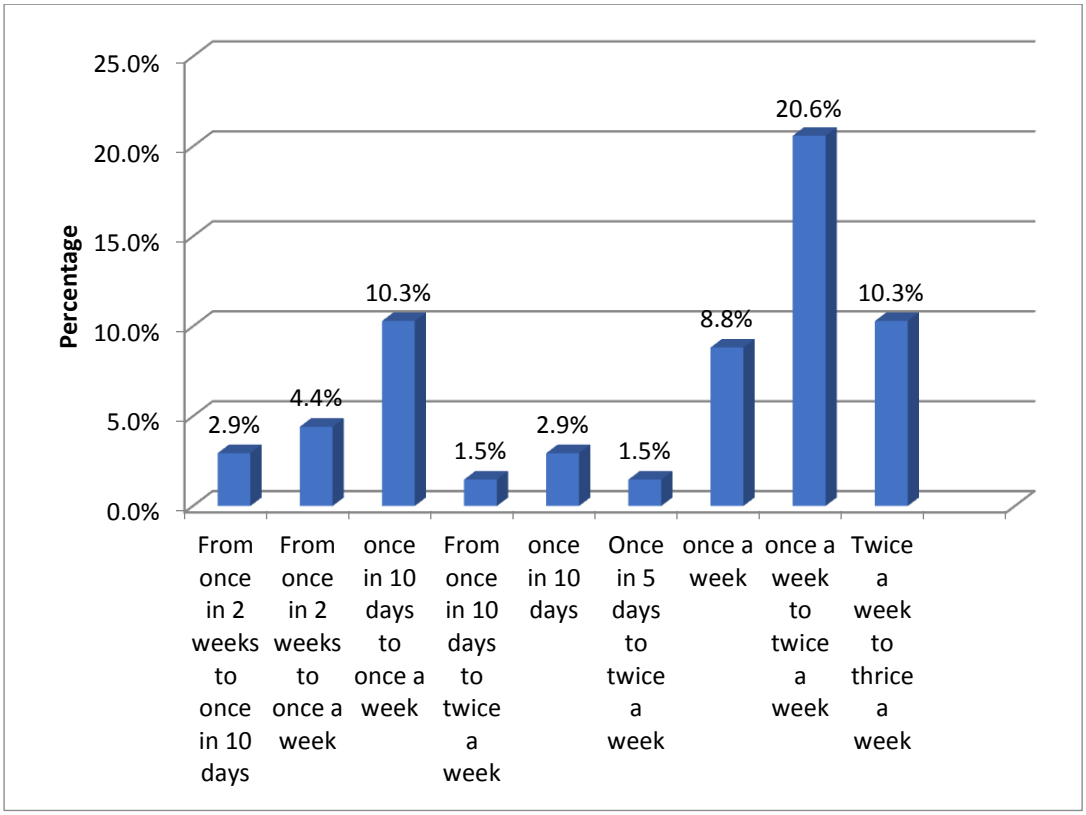

Figure 9: Trends of transition to more frequent hemodialysis

The trend of transition in the frequency of hemodialysis among the participants, was as follows:

a. A transition from once every 2 weeks to once every 10 days was observed in 3 patients (4.4%).

b. A shift from once every 2 weeks to once a week was noted in 2 patients (2.9%).

c. 7 patients (10.3%) experienced a change from once every 10 days to once a week.

d. Only 1 patient (1.5%) required an increase from once every 10 days to twice a week.

e. 2 patients (2.9%) maintained a consistent schedule of once every 10 days.

f. A single patient (1.5%) shifted from once every 5 days to twice a week.

g. 6 patients (8.8%) received hemodialysis once a week.

h. 14 patients (20.6%) experienced a change from once a week to twice a week.

i. 7 patients (10.3%) required an increase from twice a week to thrice a week.

The most common transition was seen to be from once a week to twice a week.

Table 10: Indication for more frequent transition

Indication for more frequent transition	No. of cases	Percentage
Persistent Hyperkalemia	1	1.6%
Uremic symptoms	17	27.4%
Volume overload	14	22.6%
Total	32	51.6%

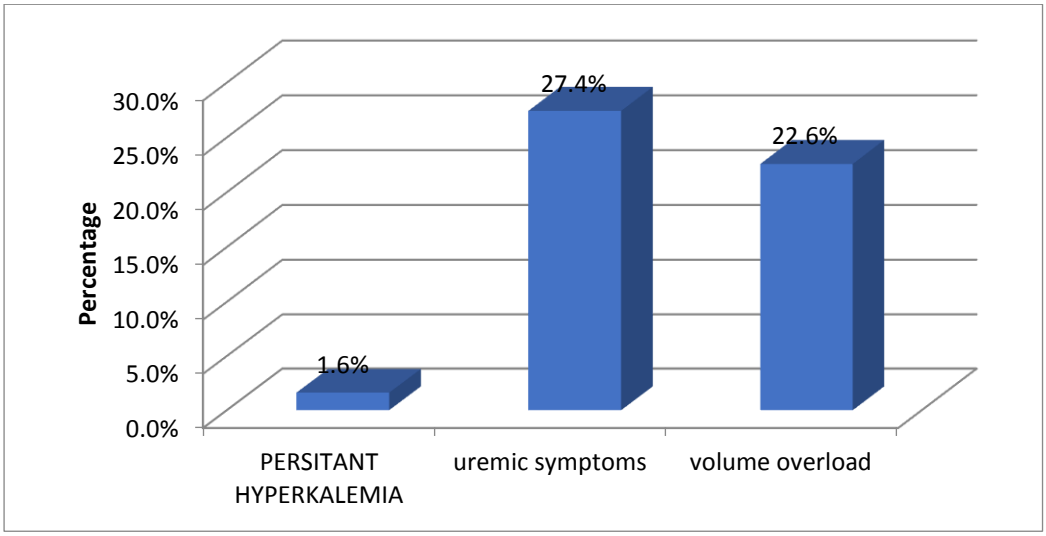

Figure 10: Indication for more frequent transition

The most common indication for transition to more frequent hemodialysis was uremic symptoms observed in 17 cases (27.4%) followed by volume overload, which was observed in 14 cases (22.6%) and persistent hyperkalemia, found in 1 patient (1.6%).

Table 11: No. of admissions

No. of admissions	No. of cases	Percentage
0	35	51.5%
1	25	36.8%
2	7	10.3%
3	1	1.5%
Total	68	100.0%

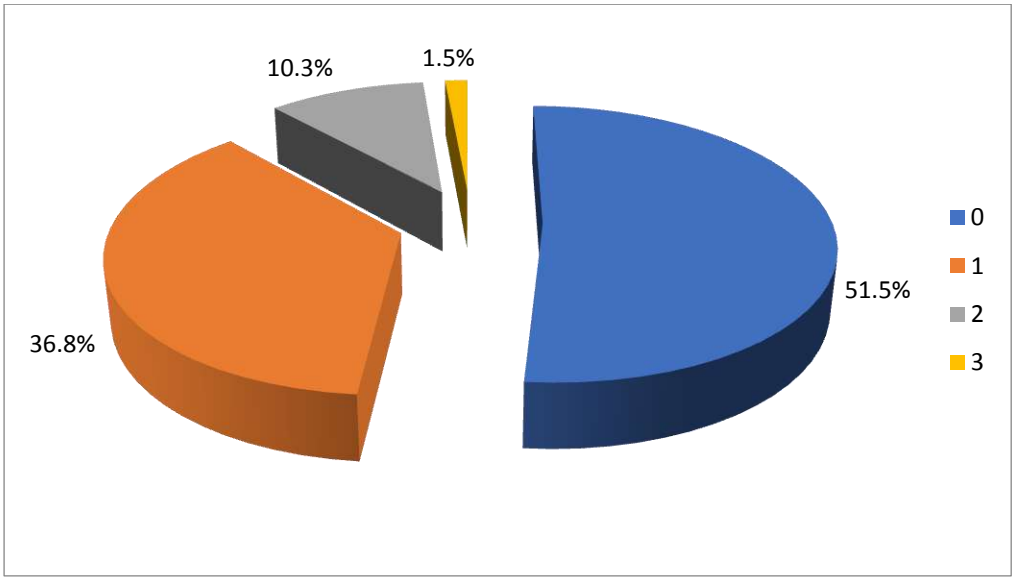

Figure 11: No. of admissions

During the 6-month follow-up period, a total of 33 patients were admitted to the hospital for various reasons. Among them, 25 patients (36.8%) were admitted only once, while 7 patients (10.3%) required admission twice. However, one patient (1.5%) experienced the need for hospitalization three times during this period.

Table 12: Cause of admission

Cause of admission	No. of cases	Percentage
Accelerated hypertension	1	2.9%
Crbsi	1	2.9%
Cva(haemorrhage)	1	2.9%
Cva(infarct)	1	2.9%
Dka	1	2.9%
Herpes zoster infection, lrti (fungal sepsis)	1	2.9%
Hyponatremia	1	2.9%
Pericardial effusion	1	2.9%
Persistant hyperkalemia	1	2.9%
Pulmonary tuberculosis	1	2.9%
Severe anemia	1	2.9%
Tuberculous lymphadenitis	1	2.9%
Uremic symptoms	5	14.7%
Urosepsis	1	2.9%
Volume oevrload, pericardial effusion	1	2.9%
Volume overload	12	35.3%
Volume overload, lrti	1	2.9%
Volume overload, uremic symptoms	1	2.9%
Volume overload, cva, extrapulmonary kochs	1	2.9%
Total	34	100.0%

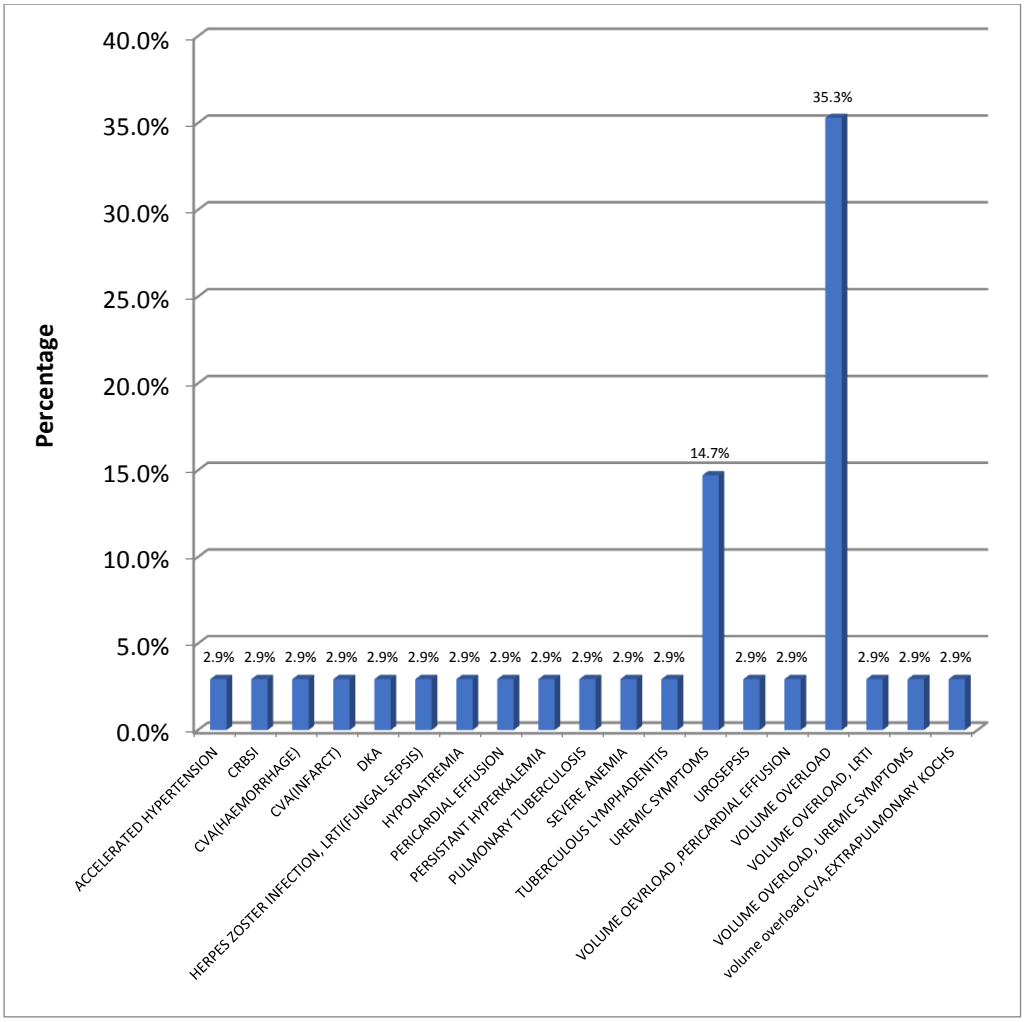

Figure 12: Cause of admission

In this study, volume overload was identified as the leading cause of admission, accounting for 35.3% of cases. Uremic symptoms followed closely behind, comprising 14.7% of admissions. Additionally, other causes for hospitalization included accelerated hypertension, CRBSI (catheter-related bloodstream infection), cerebral infarct-related CVA (cerebrovascular accident), intracerebral hemorrhage-related CVA, DKA (diabetic ketoacidosis), LRTI (lower respiratory tract infection) with fungal sepsis and herpes zoster infection, hyponatremia, pericardial effusion, persistent hyperkalemia, pulmonary tuberculosis, severe anemia, tuberculous lymphadenitis, urosepsis, volume overload with pericardial effusion, volume overload with uremic symptoms, and volume overload with CVA (infarct) accompanied by extra-pulmonary Koch's disease. Each of these causes constituted 2.9% of the total admissions.

Table 13: Mean no. of admissions

	Incremental		Regular		Z	p-value
	Mean	SD	Mean	SD		
No of admissions	0.65	0.75	0.56	0.71	0.491	0.625

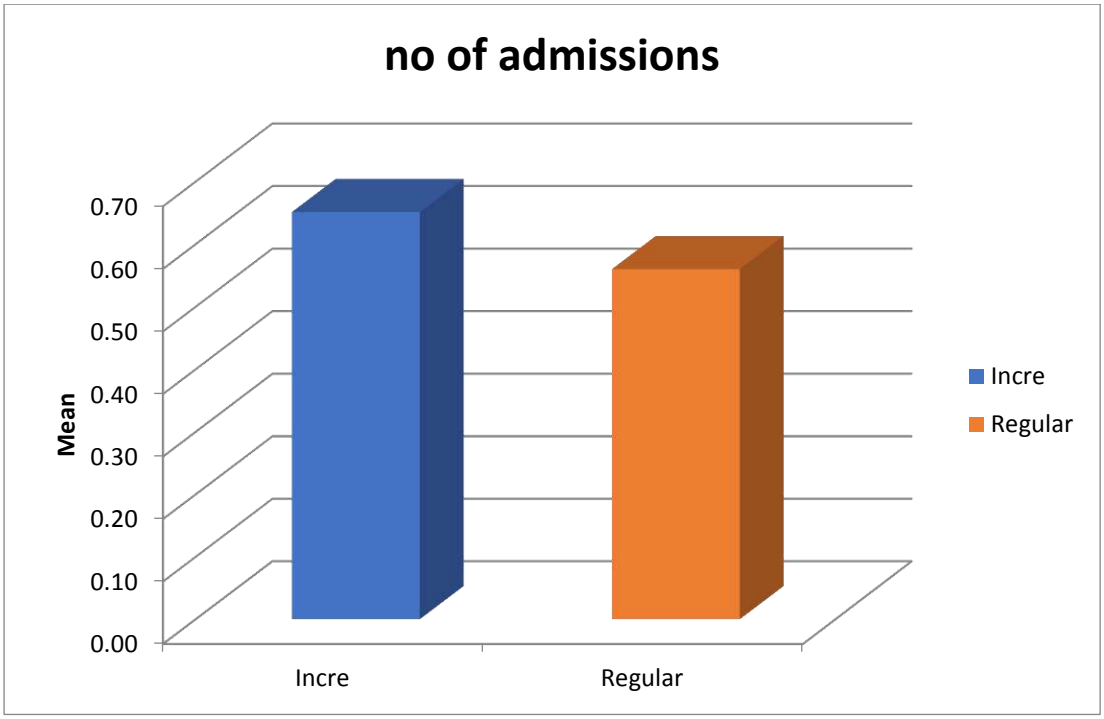

Figure13: Mean no. of admissions

In the incremental hemodialysis group, the mean value of total admissions was determined to be 0.65, while in the regular twice-weekly hemodialysis group, it was calculated to be 0.56. However, the difference between these mean values was found to be statistically insignificant, with a p-value of 0.625.

Table 14: Total no. of death

Death	No. of cases	Percentage
N	63	92.6%
Y	5	7.4%
Total	68	100.0%

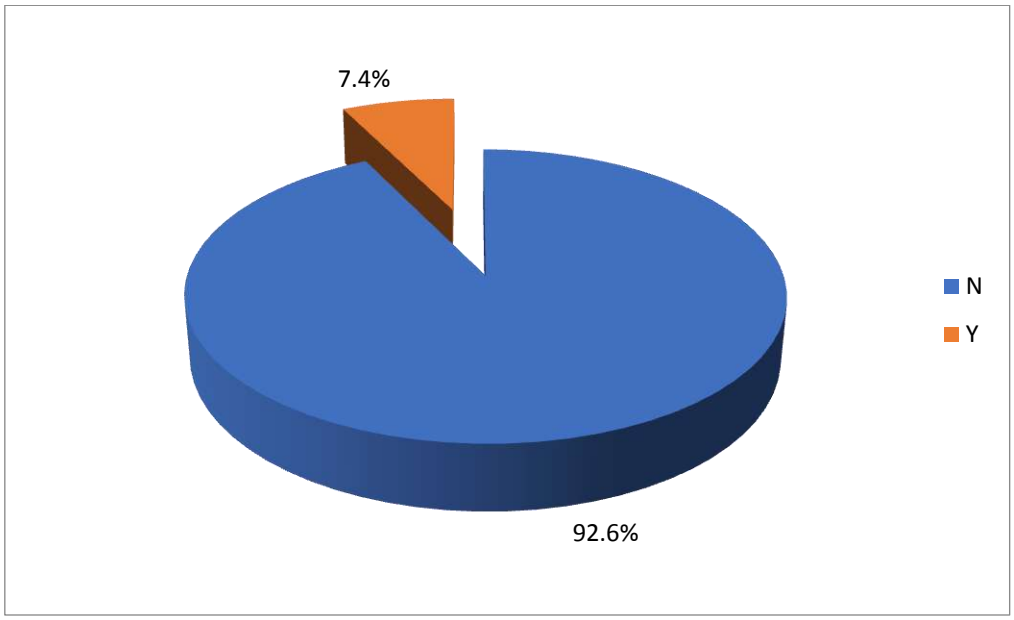

Figure 14: Total no. of death

In the present study, 5 patients (7.4%) died due to various reasons.

Table 15: Death in both groups

		Incremental		Regular		Total	Chi-square value	p-value
		No.	percentage	No.	percentage			
Death	N	41	95.3%	22	88.0%	63	1.253	0.263
	Y	2	4.7%	3	12.0%	5		
Total		43	100.0%	25	100.0%	68		

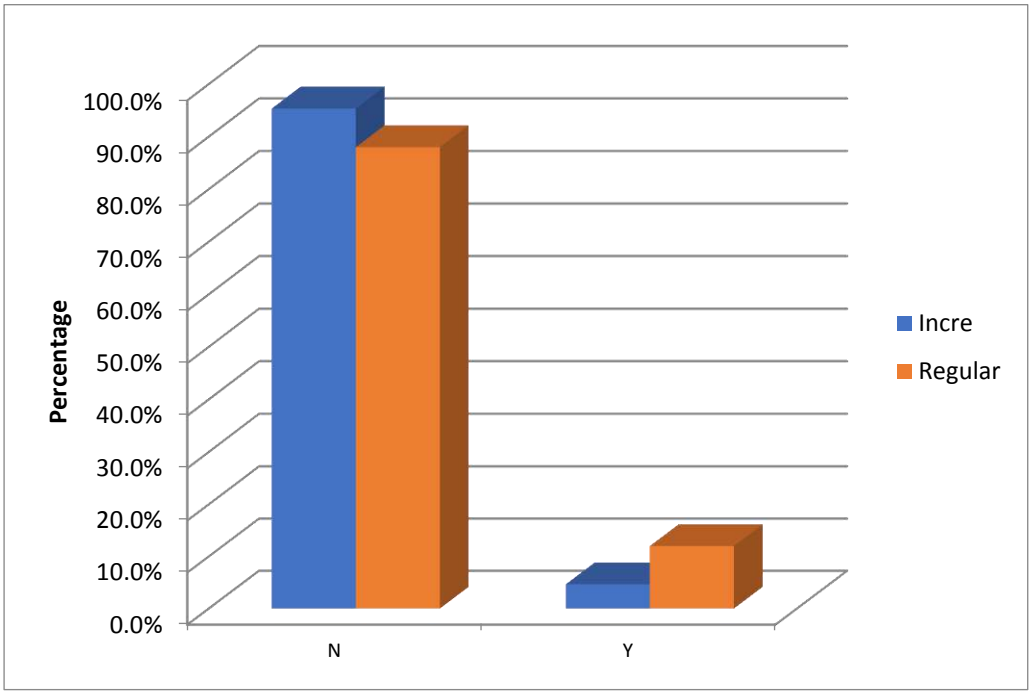

Figure 15: Death in both groups

Among the 43 patients in the incremental hemodialysis group, 2 patients (4.7%) died, whereas in the regular twice-weekly hemodialysis group comprising 25 patients, 3 patients (12%) died. However, the observed difference in mortality rates between the two groups was not statistically significant, as indicated by a p-value of 0.263.

Table 16: Cause of death

Cause of death	No. of cases	Percentage
Sudden cardiac death	2	40.0%
Cardiogenic shock	1	20.0%
Covid pneumonitis	1	20.0%
Extrapulmonary kochs	1	20.0%

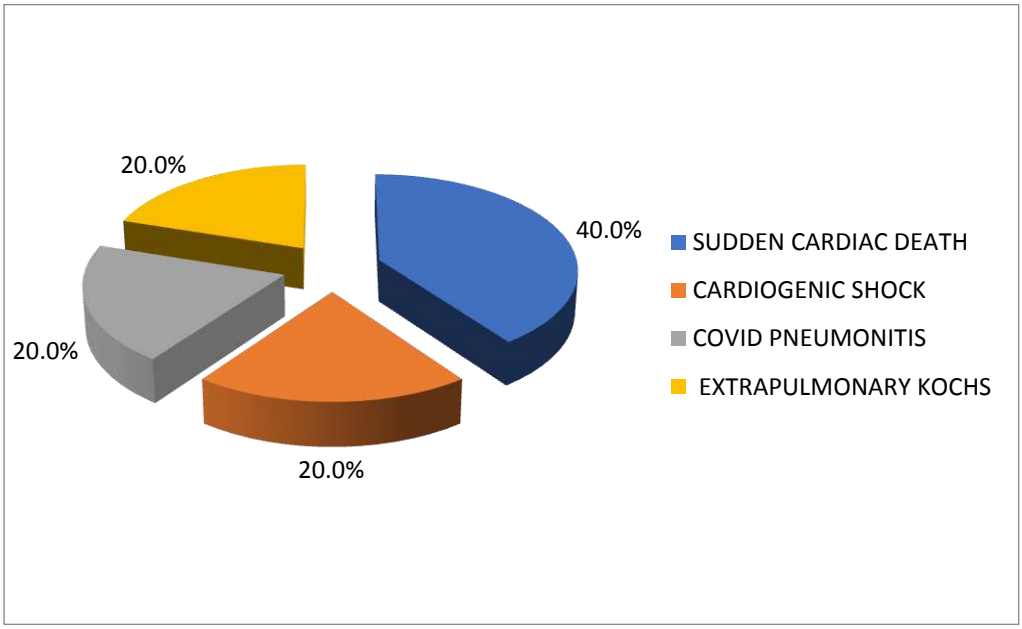

Figure 16: Cause of death

Among the five patients who died, two of them (40%) were attributed to sudden cardiac death. The remaining three patients (60%) succumbed to cardiogenic shock, complications from COVID pneumonitis, and extrapulmonary Koch's disease, respectively.

Table 17: 2 D echocardiography findings

	Incremental		Regular		Total	Chi-square value	p-value
	No.	%age	No.	%age			
2D Echocardiography at Baseline							
Abnormal	22	51.2%	18	72.0%	40	2.834	0.127
Normal	21	48.8%	7	28.0%	28		
2D Echocardiography at 6 months							
Improved	3	7.3%	0	0.0%	3	9.860	0.020
Unchanged	22	53.7%	5	22.7%	27		
Worsened	16	39.0%	17	77.3%	33		

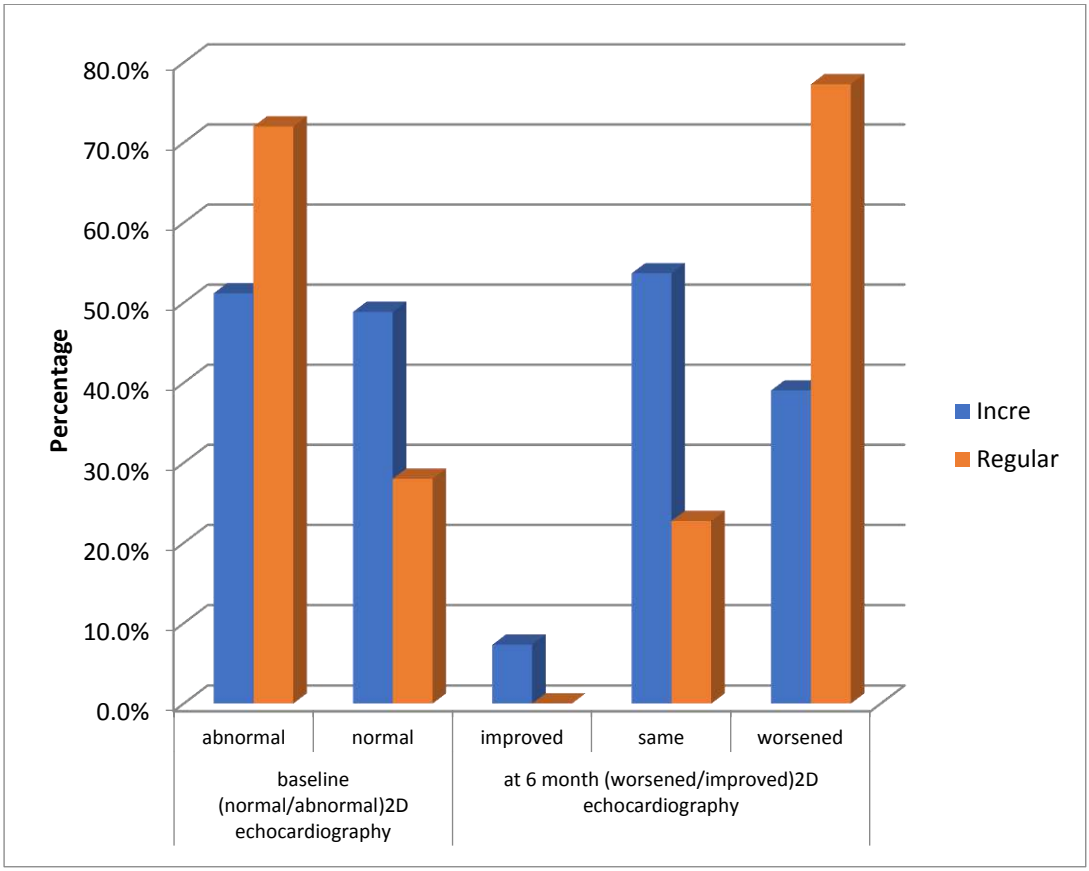

Figure 17: 2 D echocardiography findings

Upon initiation of incremental hemodialysis, it was observed that 21 patients (48.8%) exhibited normal ejection fraction findings on echocardiography, while 22 patients (51.2%) had reduced ejection fraction. In the regular twice-weekly hemodialysis group, 7 patients (28%) presented with normal ejection fraction, while 18 patients had reduced ejection fraction.

Following a 6-month period in the incremental hemodialysis group, 3 patients (7.3%) showed improvement in ejection fraction, 22 patients (53.7%) maintained the same echocardiographic findings, and 16 patients (39.0%) experienced a decline in ejection fraction. Conversely, in the regular hemodialysis group, 5 patients (22.7%) exhibited consistent echocardiographic findings, while 17 patients (77.3%) demonstrated a deterioration in ejection fraction.

Statistical analysis revealed that the difference between these two groups was not statistically significant, with a p-value of 0.020.

Table 18: Urea clearance, creatinine clearance, residual renal function

	Incremental group		Regular group		Z	p-value
	Mean	SD	Mean	SD		
UREA CLEARANCE						
Baseline	1.78	1.06	1.45	0.76	1.383	0.171
3 months	1.21	0.99	0.48	0.50	3.311	0.002
6 month	1.11	0.98	0.25	0.30	4.006	0.001
CREATININE CLEARANCE						
Baseline	1.60	0.95	1.35	0.66	1.185	0.240
3 months	1.11	0.87	0.42	0.41	3.592	0.001
6 month	1.04	0.90	0.23	0.26	4.121	0.001
URINE VOLUME (in ml over 12 hours duration)						
Baseline	390.70	192.49	294.0	130.96	2.227	0.029
3 months	261.90	190.57	113.0	124.51	3.367	0.001
6 month	242.93	189.34	65.91	80.38	4.175	0.001
RESIDUAL RENAL FUNCTION (ml/min)						
Baseline	1.68	0.97	1.40	0.70	1.287	0.203
3 months	1.17	0.91	0.45	0.45	3.567	0.001
6 month	1.07	0.93	0.24	0.28	4.087	0.001

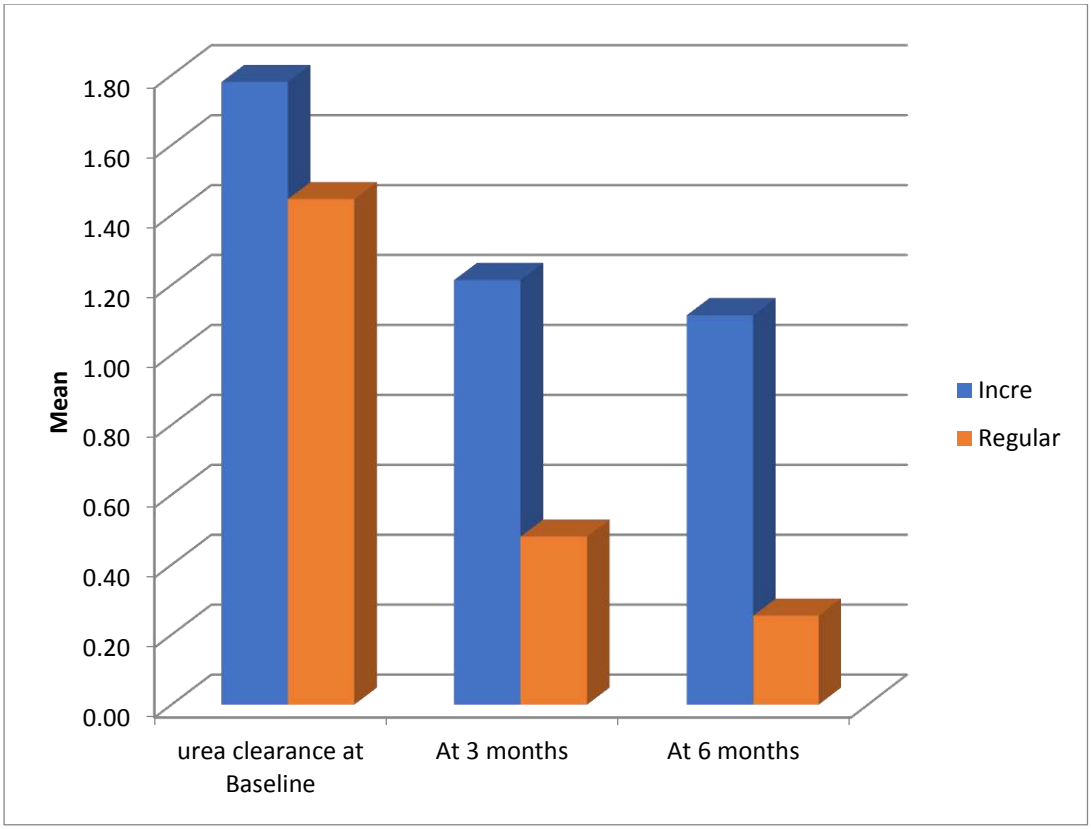

Figure 18: Urea clearance (ml/min)

In this study, the mean baseline urea clearance in the incremental hemodialysis group was determined to be 1.78 ml/min, while in the regular twice-weekly hemodialysis group, it measured 1.45 ml/min. However, after a 6-month period, the mean urea clearance decreased to 1.11 ml/min in the incremental hemodialysis group, and to 0.25 ml/min in the regular hemodialysis group. The observed difference between the two groups was found to be statistically significant, with a p-value of 0.001.

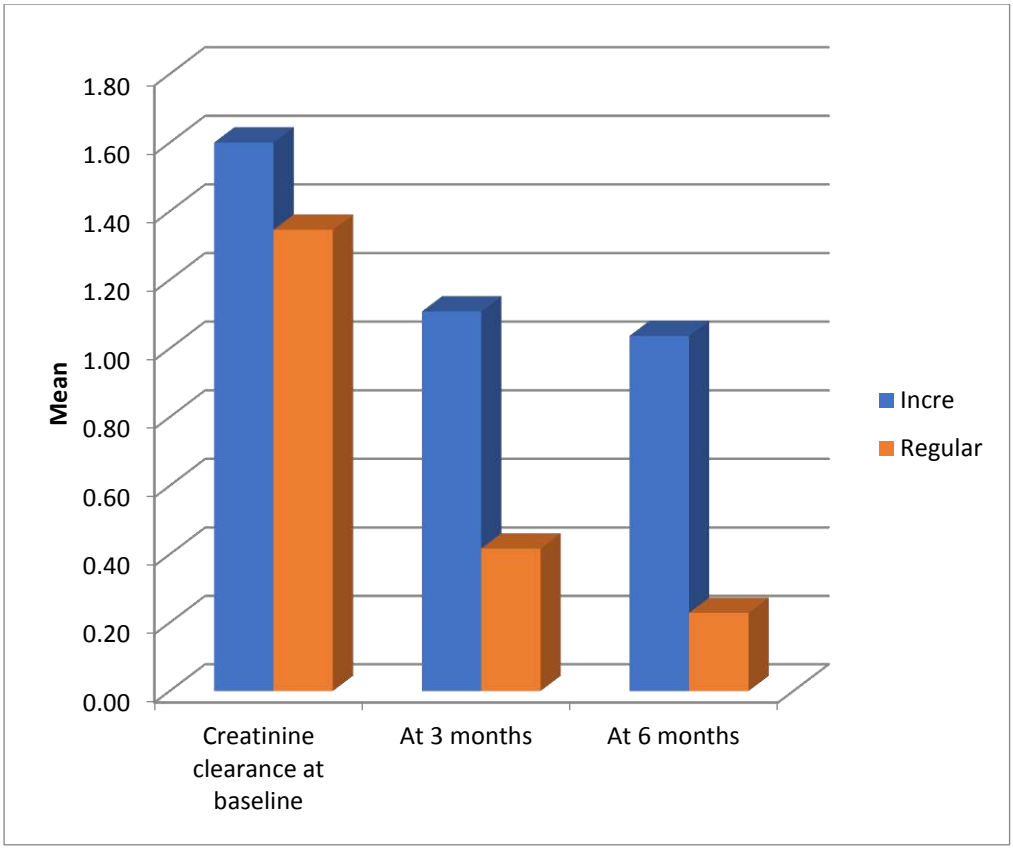

Figure 19: Creatinine clearance (ml/min)

In this study, the mean creatinine clearance, at the initiation, was 1.60 ml/min in the incremental hemodialysis group and 1.45 ml/min in the regular hemodialysis group. However, after a 6-month follow-up period, the mean creatinine clearance decreased to 1.04 ml/min in the incremental hemodialysis group and to 0.23 ml/min in the regular hemodialysis group. Notably, the observed difference between the two groups was statistically significant, with a p-value of 0.001.

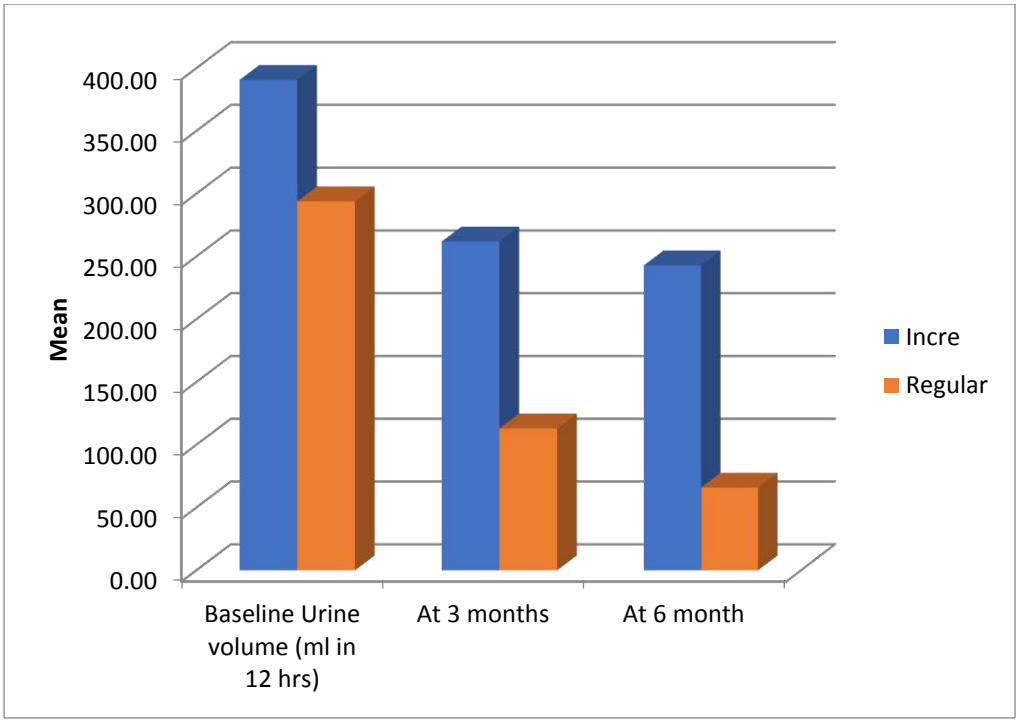

Figure 20: Urine volume (ml in 12 hours)

The mean urine volumes within a 12-hour period at the time of initiation were 390.70 ml in the incremental hemodialysis group and 294.00 ml in the regular hemodialysis group. However, after a 6-month duration, the mean urine volumes decreased to 242.93 ml in the incremental hemodialysis group and 65.91 ml in the regular hemodialysis group, with a statistically significant difference (p=0.001).

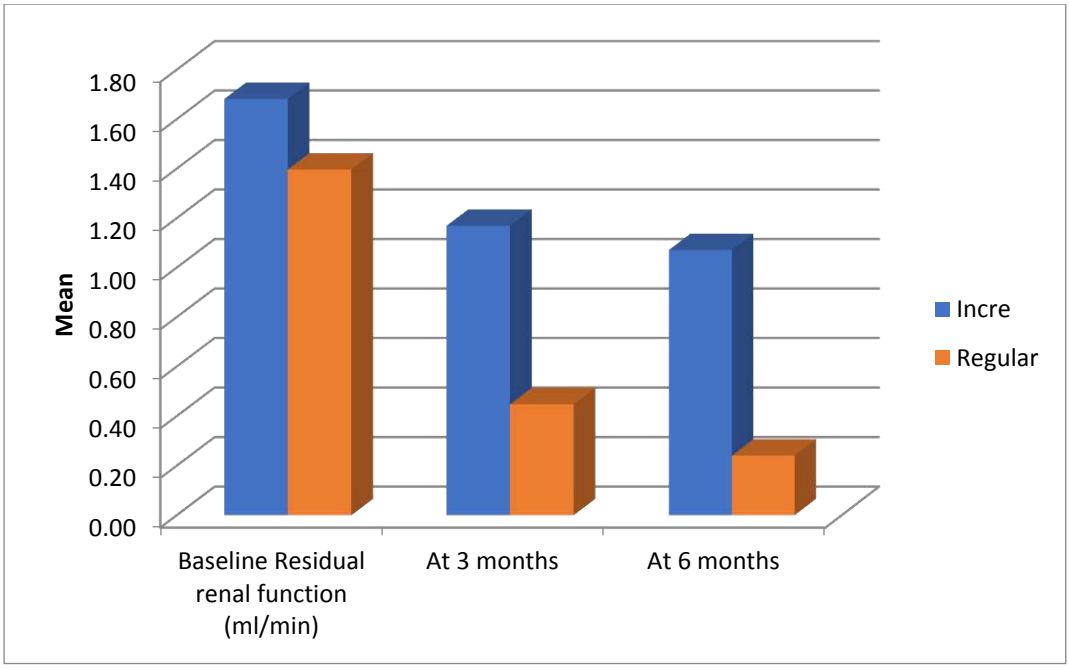

Figure 21: Residual renal function (ml/min)

The baseline residual renal function was measured to be 1.68 ml/min in the incremental hemodialysis group and 1.40 ml/min in the regular hemodialysis group. However, after a 6-month period, the residual renal function decreased to 1.07 ml/min in the incremental hemodialysis group and a mere 0.24 ml/min in the regular hemodialysis group. The observed difference between the two groups was found to be statistically significant, with a p-value of 0.001.

Table 19: Hemoglobin concentration (gm/dl)

Hemoglobin	Incremental		Regular		Z	p-value
	Mean	SD	Mean	SD		
At initiation	9.06	1.49	8.92	1.34	0.365	0.716
1 month	9.07	1.42	8.83	1.38	0.671	0.505
2 month	8.92	1.29	8.90	1.23	0.058	0.954
3 month	8.80	1.36	8.79	1.21	0.032	0.975
4 month	8.78	1.25	8.32	1.02	1.466	0.148
5 month	8.73	1.21	8.25	0.84	1.666	0.101
6 month	8.60	1.28	8.39	0.96	0.675	0.502

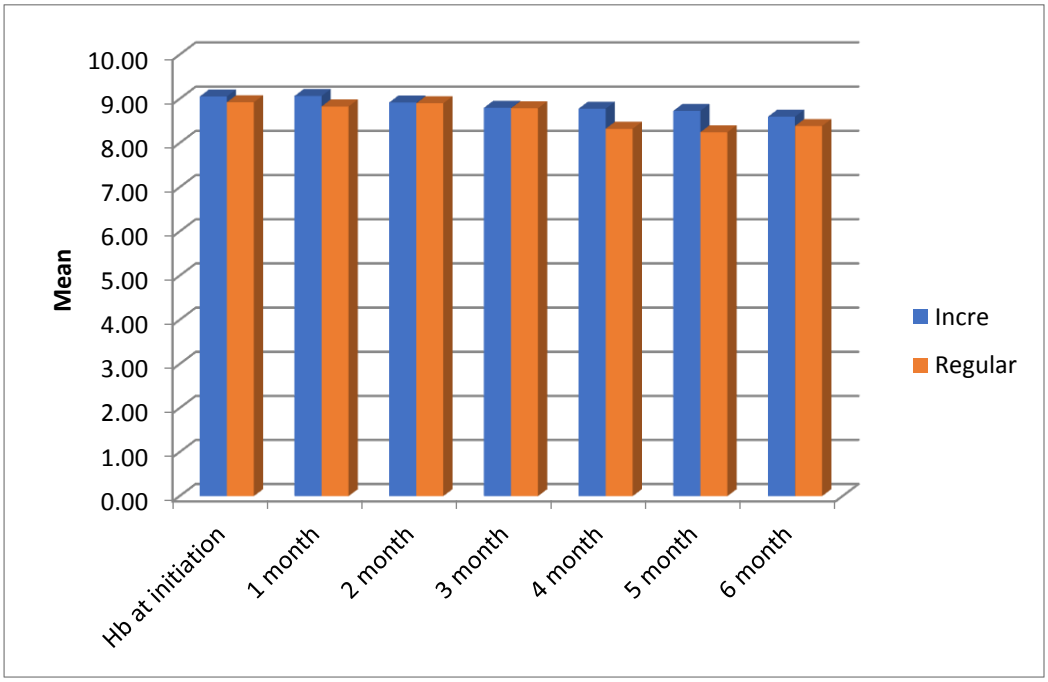

Figure 22: Hemoglobin concentration (gm/dl)

The mean hemoglobin concentration at the initiation of hemodialysis was recorded as 9.06 gm/dl in the incremental hemodialysis group and 8.92 gm/dl in the regular hemodialysis group. After a 6-month period, the mean hemoglobin concentration slightly decreased to 8.60 gm/dl in the incremental hemodialysis group and 8.39 gm/dl in the regular twice-weekly hemodialysis group. However, the observed difference between the two groups was not statistically significant, as indicated by a p-value of 0.502.

Table 20: Serum calcium level (mg/dl)

Serum calcium (mg/dl)	Incremental		Regular		Z	p-value
	Mean	SD	Mean	SD		
At initiation	7.80	1.10	7.88	0.77	-0.299	0.766
1 month	7.82	0.83	7.74	0.69	0.391	0.697
2 month	7.70	0.72	7.72	0.70	-0.079	0.937
3 month	7.71	0.76	7.85	0.81	-0.676	0.501
4 month	7.75	0.76	7.79	0.79	-0.184	0.855
5 month	7.70	0.72	7.76	0.92	-0.316	0.753
6 month	7.66	0.79	7.60	0.92	0.296	0.768

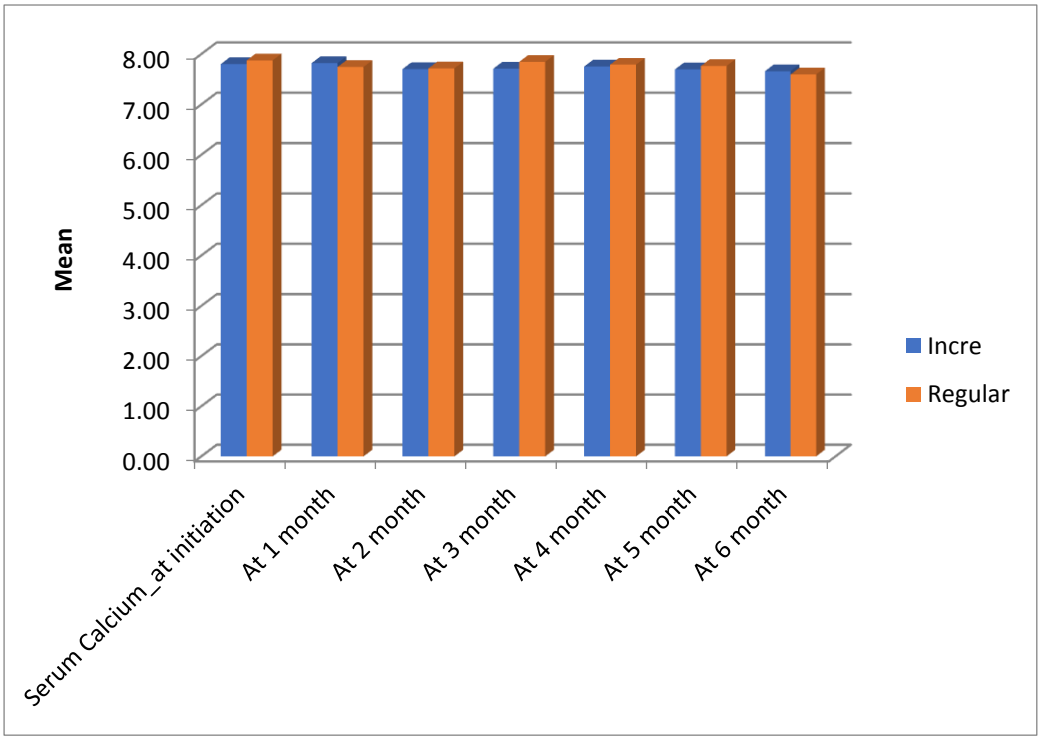

Figure 23: Serum calcium level (mg/dl)

Mean serum calcium concentration at the time of initiation was 7.80 and 7.88 mg/dl in incremental hemodialysis group and regular twice weekly hemodialysis group respectively. At the end of 6 months, it was found to be 7.66 mg/dl and 7.60 mg/dl in incremental hemodialysis group and regular twice weekly hemodialysis group respectively. The difference was not found to be significant (p=0.768).

Table 21: Serum phosphorus level (mg/dl)

Serum phosphorus	Incremental		Regular		Z	p-value
mg/dl	Mean	SD	Mean	SD		
At initiation	5.72	0.96	5.48	0.94	1.008	0.317
1 month	5.74	0.73	5.55	0.78	0.992	0.325
2 month	5.64	0.59	5.41	0.76	1.371	0.175
3 month	5.61	0.73	5.26	0.79	1.809	0.075
4 month	5.65	0.83	5.35	0.68	1.457	0.150
5 month	5.44	0.69	5.30	0.67	0.820	0.415
6 month	5.50	0.68	5.31	0.79	0.982	0.330

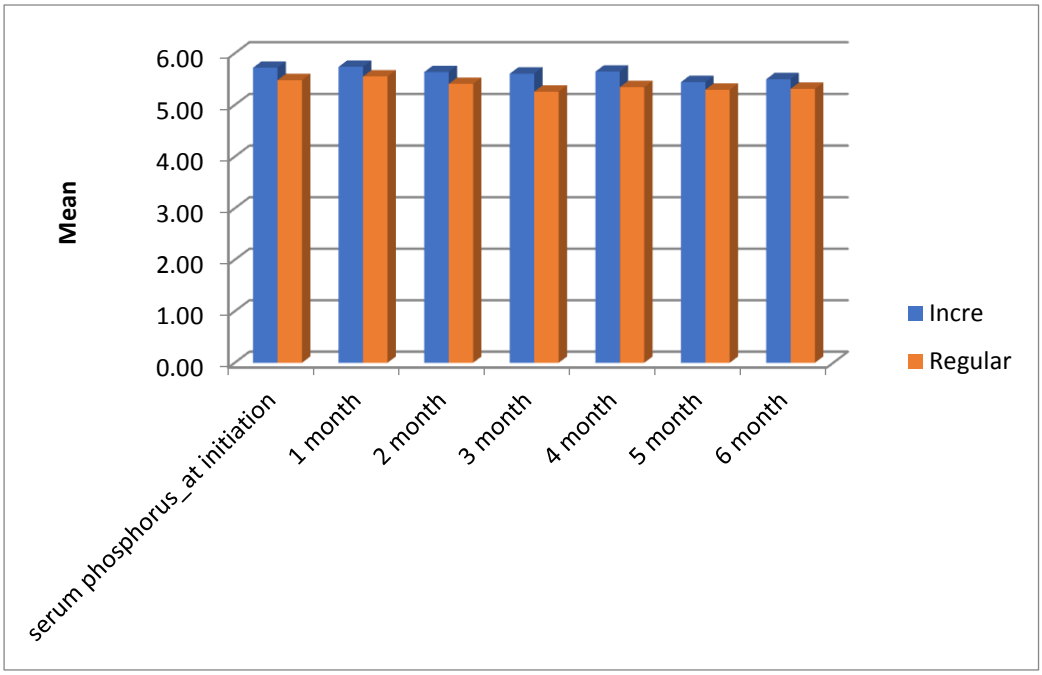

Figure 24: Serum phosphorus level (mg/dl)

Mean serum phosphorus concentration was 5.72 mg/dl in incremental hemodialysis group and 5.48 mg/ dl in regular twice weekly hemodialysis group. At the end of 6 month mean phosphorus concentration was found to be 5.50 mg/dl and 5.31 mg/dl in incremental hemodialysis group and regular twice weekly hemodialysis group respectively. The difference was not found to be significant (p=0.330)

Table 22: Serum PTH level (pg/ml)

Serum PTH_	Incremental		Regular		Z	p-value
	Mean	SD	Mean	SD		
At initiation	372.05	153.14	400.80	177.01	-0.705	0.483
3 month	384.00	133.88	411.30	128.23	-0.801	0.426
6 month	409.34	154.99	458.05	153.89	-1.192	0.238

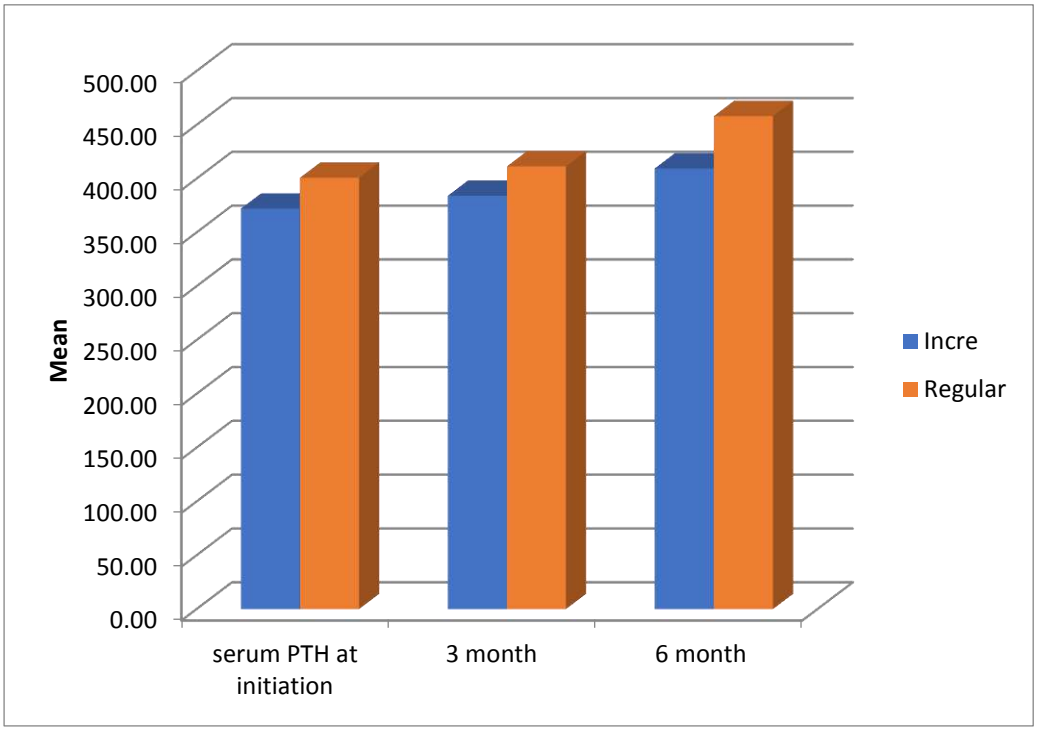

Figure 25: Serum PTH (pg/ml)

The mean serum PTH (parathyroid hormone) concentration at the initiation of the study was 372.05 pg/ml in the incremental hemodialysis group, while in the regular twice-weekly hemodialysis group, it was 400.80 pg/ml. After a 6-month period, the mean serum PTH concentration increased to 409.34 pg/ml in the incremental hemodialysis group and 458.05 pg/ml in the regular twice-weekly hemodialysis group. However, the observed difference between the two groups was not statistically significant, with a p-value of 0.238.

Table 23: Serum protein (gm/dl) and serum albumin (gm/dl)

	Incremental		Regular		Z	p-value
	Mean	SD	Mean	SD		
SERUM TOTAL PROTEIN						
At initiation	6.52	0.81	6.22	0.71	1.564	0.123
3 month	6.40	0.65	6.15	0.71	1.398	0.167
6 month	6.33	0.61	6.22	0.63	0.678	0.501
SERUM ALBUMIN						
At initiation	3.41	0.56	3.22	0.75	1.174	0.244
3 month	3.24	0.54	3.35	1.00	-0.592	0.556
6 month	3.18	0.51	3.37	1.14	-0.876	0.385

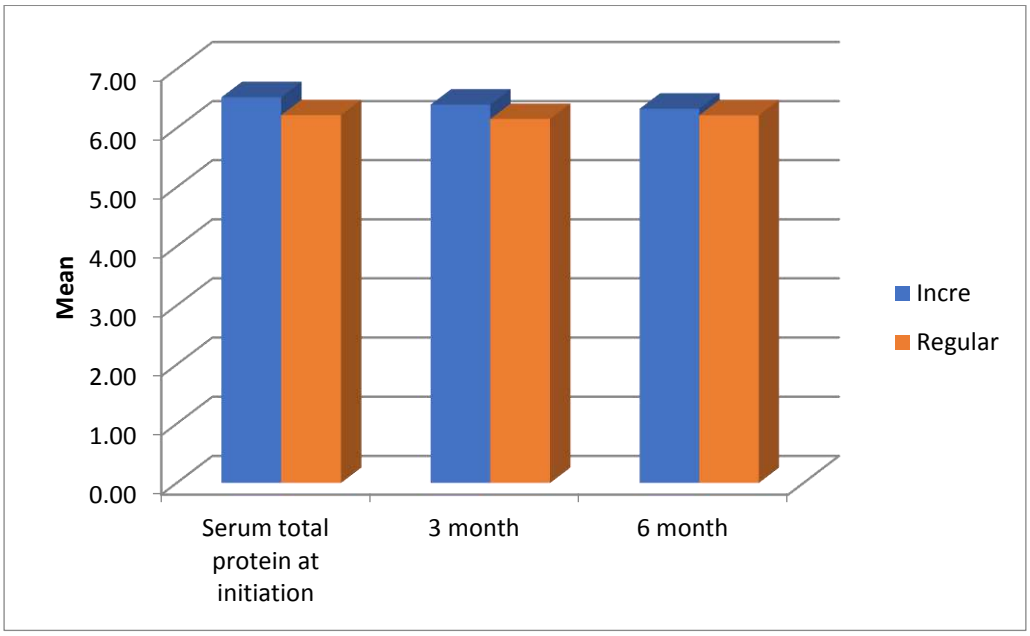

Figure 26: Serum protein (gm/dl)

In this study, the mean baseline total serum protein was determined to be 6.52 gm/dl in the incremental hemodialysis group, while in the regular twice-weekly hemodialysis group, it was slightly lower at 6.22 gm/dl. After a 6-month duration, the mean total serum protein levels measured 6.33 gm/dl in the incremental hemodialysis group and remained at 6.22 gm/dl in the regular hemodialysis group. The observed difference between the two groups was not statistically significant, with a p-value of 0.501.

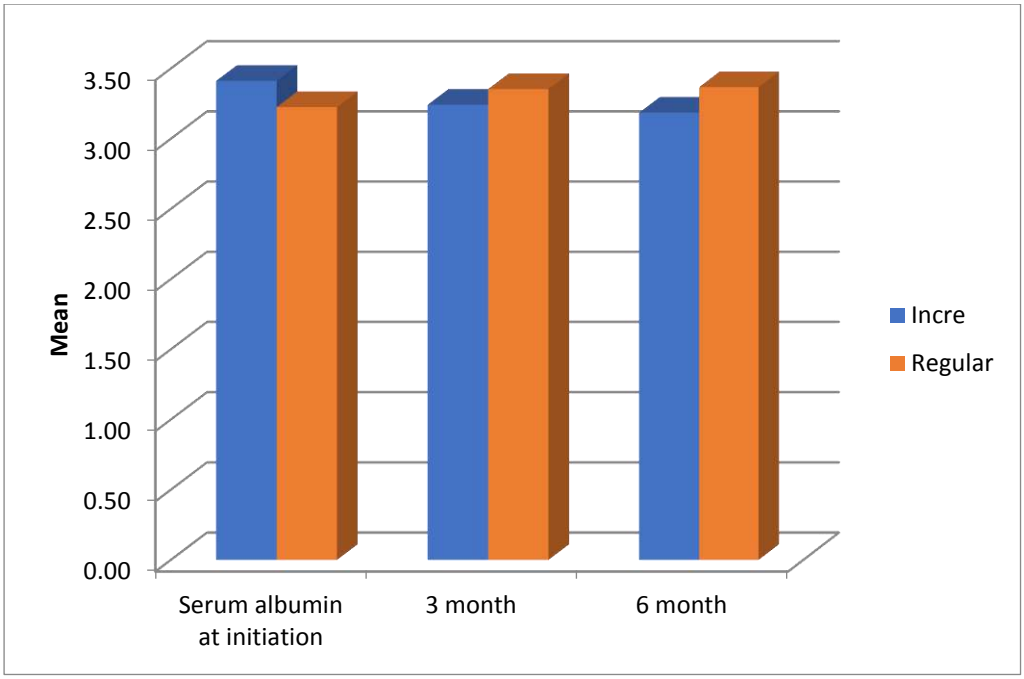

Figure 27: Serum albumin (gm/dl)

Mean serum albumin level at the initiation of the study was 3.41 gm/dl in incremental hemodialysis group and 3.22 gm/dl in the regular hemodialysis group. At the end of 6 months, it was 3.18 gm/dl and 3.37 gm/dl in the incremental and regular hemodialysis group respectively. The difference was not significant (p=0.385).

Table 24: Mean of total no. of hemodialysis sessions

	Incremental		Regular		Z	p-value
	Mean	SD	Mean	SD		
No of dialysis sessions	33.44	14.06	47.88	12.42	-4.257	0.001

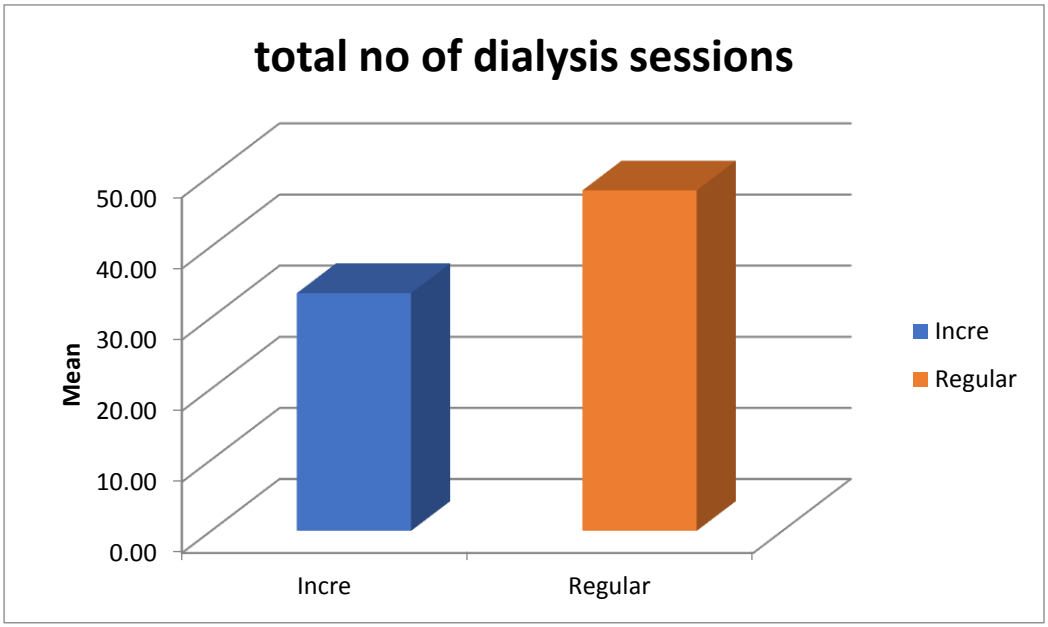

Figure 28: Mean of total no. of hemodialysis sessions

During the 6-month study period, the mean total number of hemodialysis sessions in the incremental hemodialysis group was 33.44, whereas it was significantly higher at 47.88 in the regular twice-weekly hemodialysis group. The observed difference between the two groups was found to be statistically significant, with a p-value of 0.001.

Table 25: Quality of life (base line scores)

Quality of life	**Incremental**		**Regular**		**Z**	**p-value**
(base line scores)	Mean	SD	Mean	SD		
Domain 1 at Baseline						
Raw score	18.53	2.15	17.72	3.08	1.282	0.204
Transformed score 4-20	10.47	1.18	10.16	1.70	0.871	0.387
Transformed score (0-100)	40.63	7.36	38.60	10.68	0.925	0.358
Domain 2 at Baseline						
Raw score	18.26	2.39	17.96	2.70	0.469	0.641
Transformed score (4-20)	12.23	1.63	12.08	1.82	0.356	0.723
Transformed score (0-100)	51.53	10.16	50.60	11.38	0.350	0.727
Domain 3 at Baseline						
Raw score	8.14	1.34	8.08	1.26	0.181	0.857
Transformed score (4-20)	10.91	1.76	10.92	1.58	-0.031	0.976
Transformed score (0-100)	43.21	10.98	43.36	9.81	-0.057	0.955
Domain 4 at Baseline						
Raw score	20.33	2.63	19.52	2.18	1.295	0.200
Transformed score (4-20)	10.42	1.35	9.92	1.12	1.562	0.123
Transformed score (0-100)	40.33	8.46	37.20	7.08	1.556	0.124

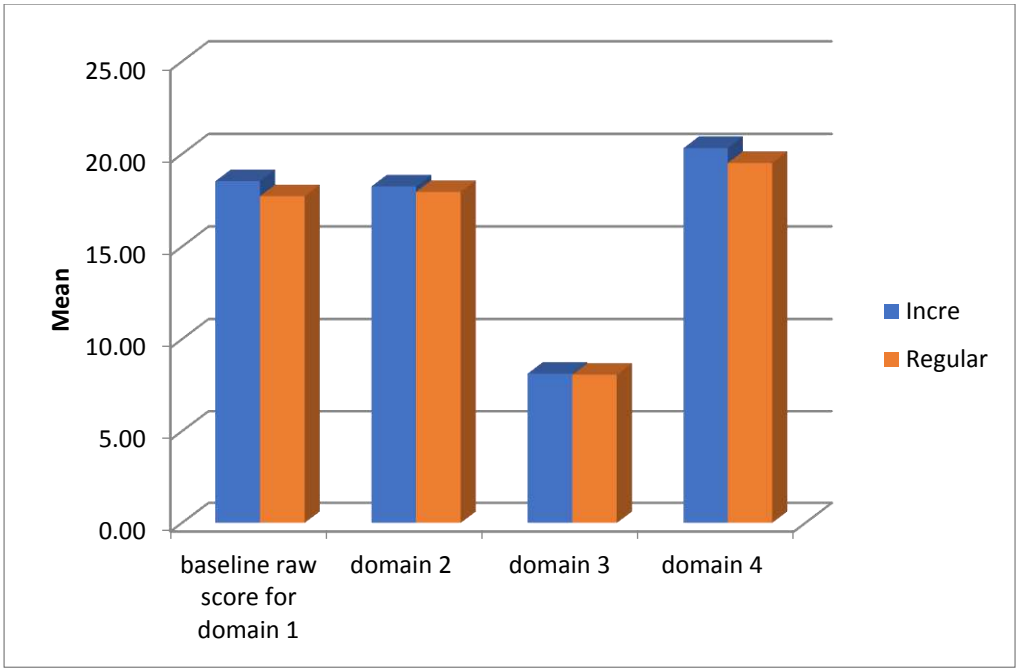

Figure 29: Base line raw score

As per WHOQOL-BREF score, at the time of initiation of maintenance hemodialysis (baseline) mean of domain 1 raw score for the incremental hemodialysis group was 18.53, and it was 17.72 for the regular twice weekly hemodialysis group. Mean of domain 2 raw score was 18.26 for incremental hemodialysis group and 17.96 for regular twice weekly hemodialysis group. Mean of domain 3 raw score was 8.14 for incremental hemodialysis group and 8.08 for regular twice weekly hemodialysis group. Mean of domain 4 raw score was 20.33 for incremental hemodialysis group and 19.52 for regular twice weekly hemodialysis group, the difference was not significant.

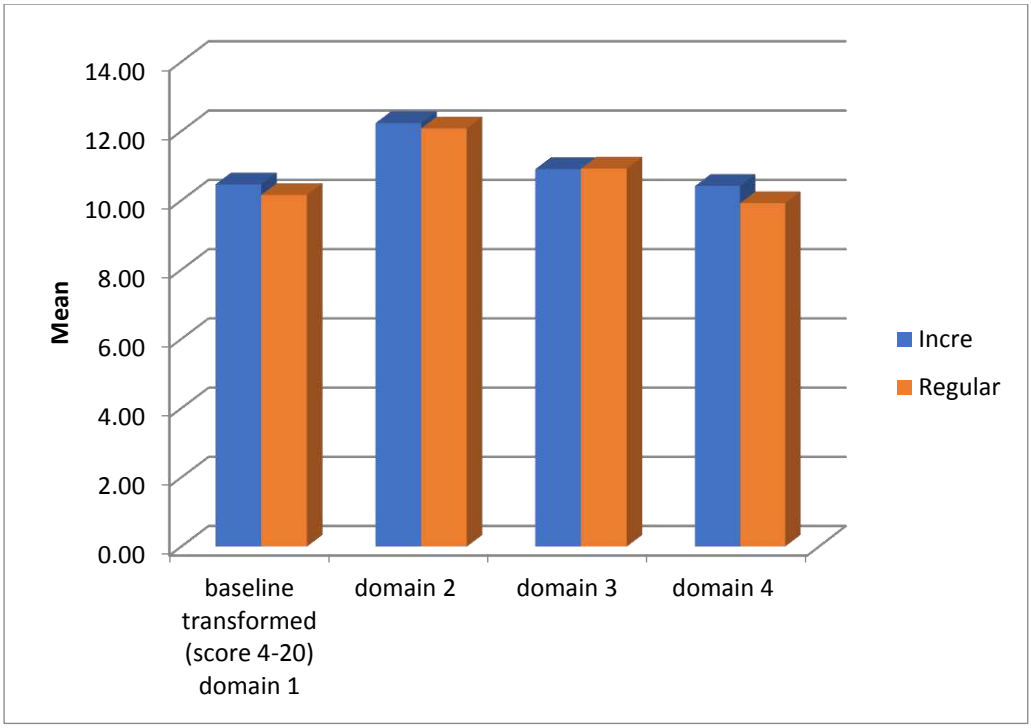

Figure 30: Base line transformed score (4-20)

The mean of transformed score (4-20), came to be 10.47 for domain 1 in incremental hemodialysis group and 10.16 for regular hemodialysis group. It was 12.23 and 12.08 for domain 2 in incremental hemodialysis group and regular hemodialysis group respectively. For domain 3, the mean of transformed score was 10.91 for incremental hemodialysis group and 10.92 for regular hemodialysis group. For domain 4, the mean of transformed score was 10.42 for incremental hemodialysis group and 9.92 for regular hemodialysis group. The difference was not statistically significant.

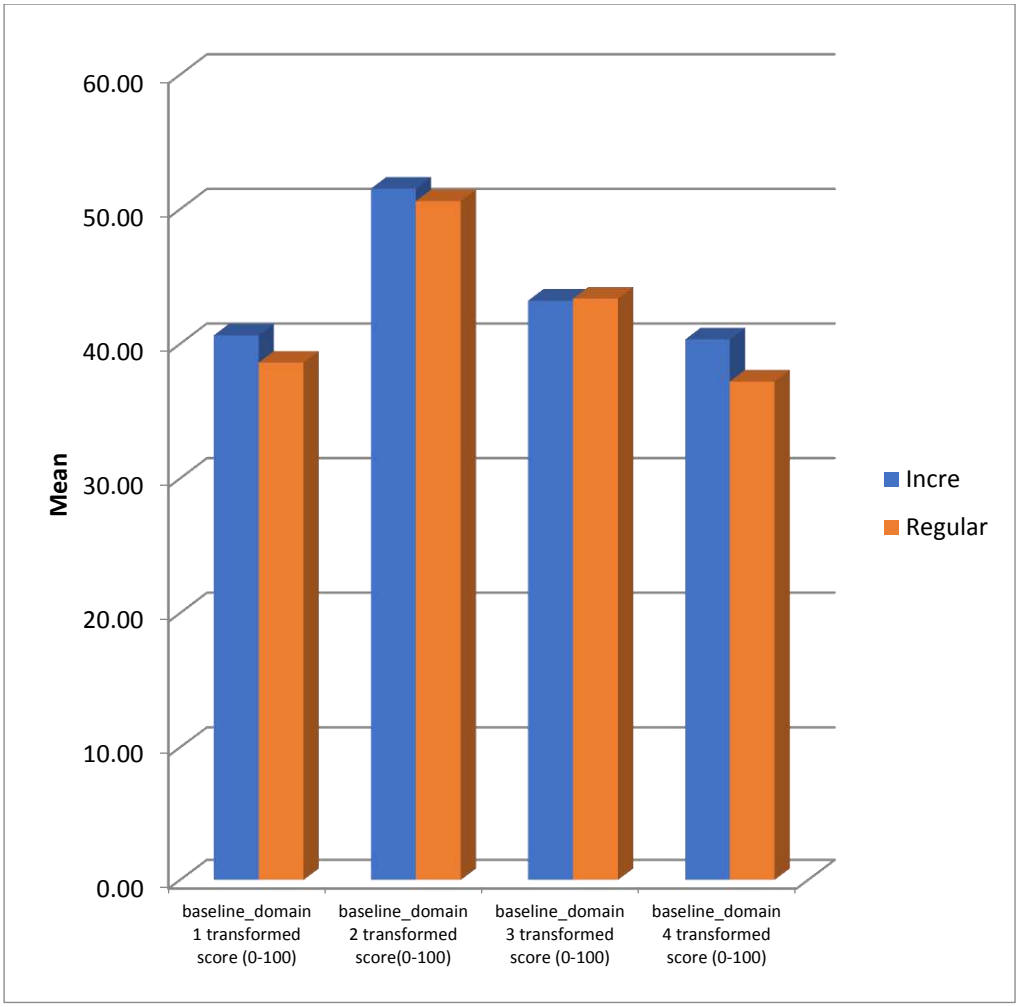

Figure 31: Base line transformed score (0-100)

At the time of initiation of maintenance hemodialysis, the mean of transformed score (0-100), came to be 40.63 for domain 1 in incremental hemodialysis group and 38.60 for regular hemodialysis group. It was 51.53 and 50.60 for domain 2 in incremental hemodialysis group and regular hemodialysis group respectively. For domain 3, the mean of transformed score was 43.21 for incremental hemodialysis group and 43.36 for regular hemodialysis group. For domain 4, the mean of transformed score was 40.33 for incremental hemodialysis group and 37.20 for regular hemodialysis group. The difference was not statistically significant.

Table 26: Quality of life (scores at 6 months)

Quality of life	Incremental		Regular		Z	p-value
(scores at 6 months)	Mean	SD	Mean	SD		
Domain 1 at 6 month						
Raw score	19.98	3.43	19.41	3.81	0.601	0.550
Transformed score 4-20	11.66	1.89	11.14	2.25	0.976	0.333
Transformed score (0-100)	47.71	12.27	44.55	14.00	0.928	0.357
Domain 2 at 6 month						
Raw score	19.68	3.38	18.91	3.75	0.834	0.408
Transformed score 4-20	13.17	2.17	12.68	2.50	0.810	0.421
Transformed score (0-100)	57.46	13.53	54.32	15.75	0.830	0.410
Domain 3 at 6 month						
Raw score	9.44	2.05	9.14	2.10	0.554	0.582
Transformed score 4-20	12.63	2.83	12.14	2.88	0.662	0.511
Transformed score (0-100)	54.00	17.75	50.82	18.09	0.674	0.503
Domain 4 at 6 month						
Raw score	23.95	4.79	22.91	5.09	0.806	0.423
Transformed score 4-20	12.22	2.44	11.68	2.53	0.822	0.414
Transformed score (0-100)	51.51	15.40	48.00	15.83	0.855	0.396

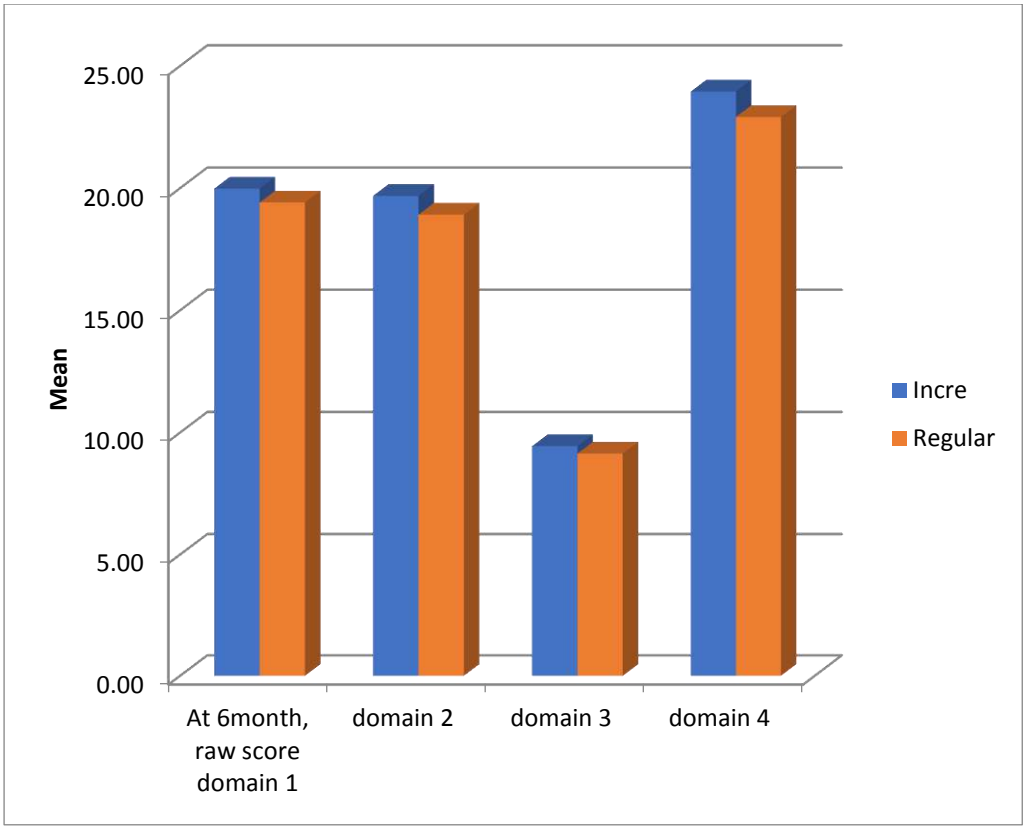

Figure 32: Quality of life, Raw score at 6 months

At the end of 6 months the mean of domain 1 raw score for the incremental hemodialysis group was 19.98, and it was 19.41 for the regular twice weekly hemodialysis group (p=0.550). The mean of domain 2 raw score was 19.68 for incremental hemodialysis group and 18.91 for regular twice weekly hemodialysis group (p=0.408). The mean of domain 3 raw score was 9.44 for incremental hemodialysis group and 9.14 for regular twice weekly hemodialysis group (p=0.582). Mean of domain 4 raw score was 23.95 for incremental hemodialysis group and 22.91 for regular twice weekly hemodialysis group (p=0.423).

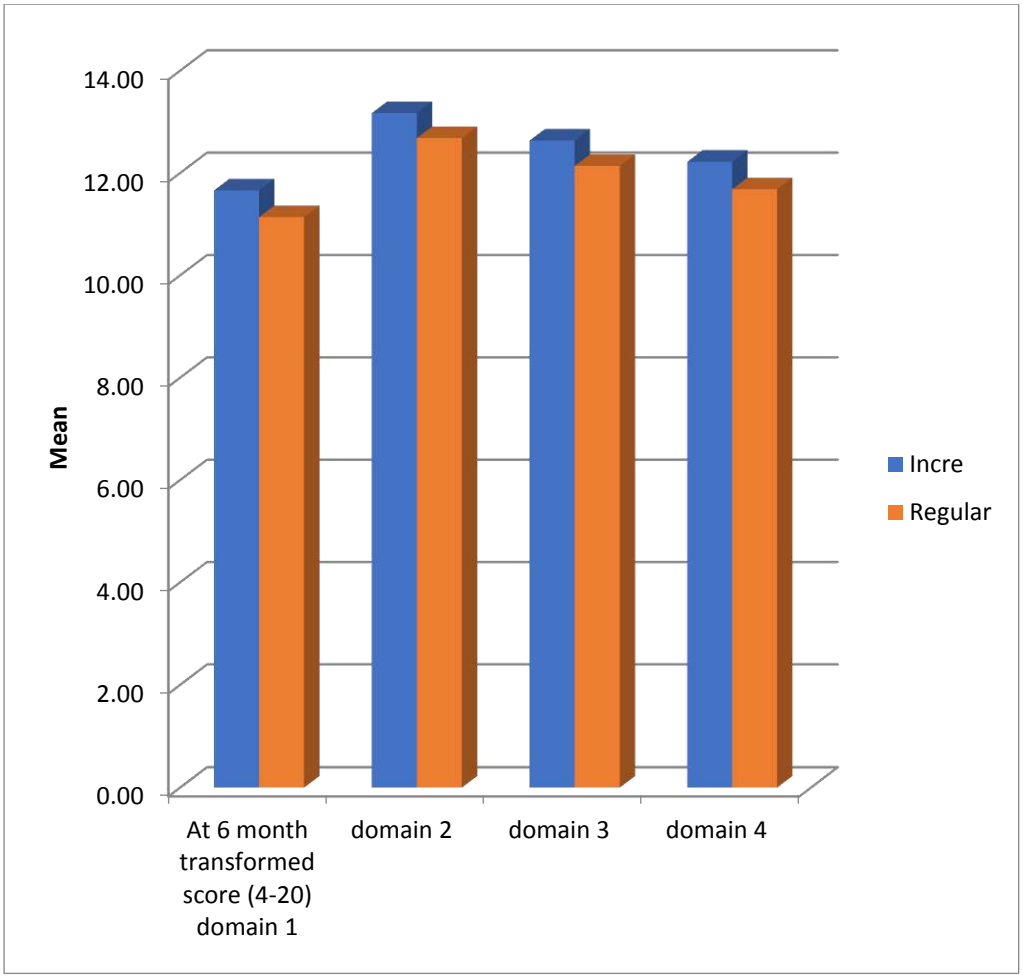

Figure 33: Quality of life, transformed score (4-20) at 6 months

At the end of 6 months, the mean of transformed score (4-20), came to be 11.66 for domain 1 in incremental hemodialysis group and 11.14 for regular hemodialysis group (p=0.333). It was 11.17 and 12.68 for domain 2 in incremental hemodialysis group and regular hemodialysis group respectively (p=0.421). For domain 3, the mean of transformed score was 12.63 for incremental hemodialysis group and 12.14 for regular hemodialysis group (p=0.511). For domain 4, the mean of transformed score was 12.22 for incremental hemodialysis group and 11.68 for regular hemodialysis group (p=0.414).

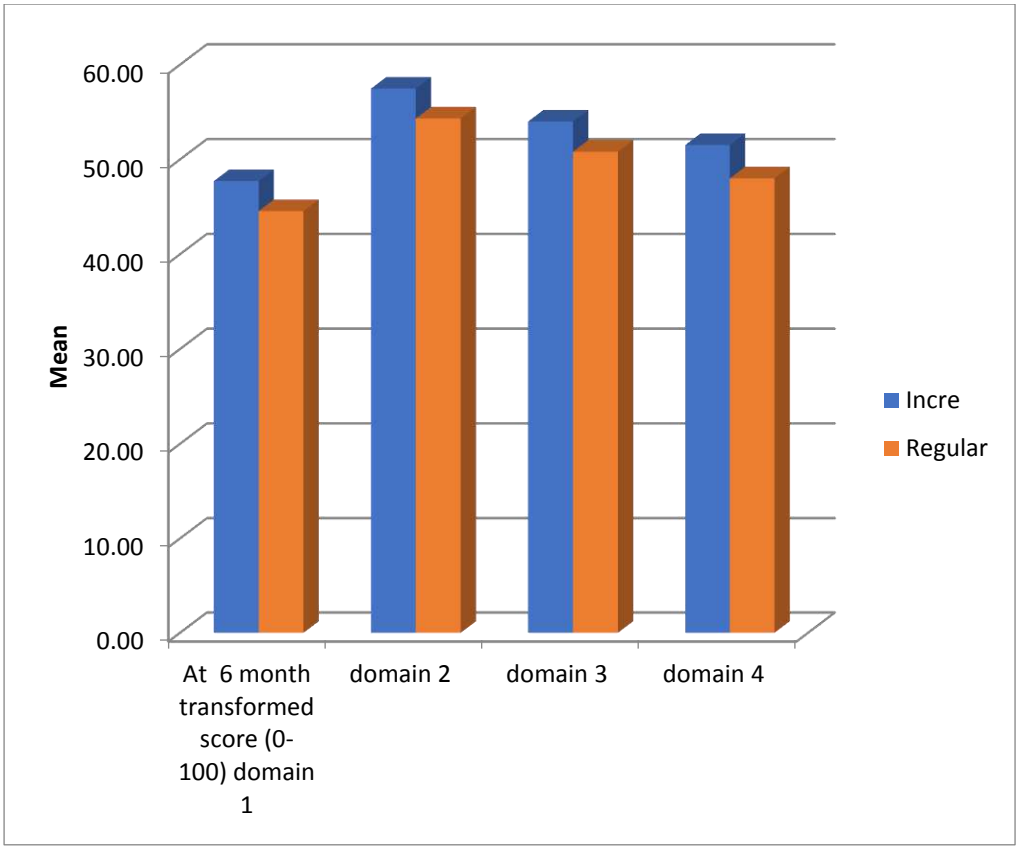

Figure 34: Quality of life, transformed score (0-100) at 6 months

At the end of 6 months, the mean of transformed score (0-100), came to be 47.71 for domain 1 in incremental hemodialysis group and 44.55 for regular hemodialysis group (p=0.357). It was 57.46 and 54.32 for domain 2 in incremental hemodialysis group and regular hemodialysis group respectively (p=0.410). For domain 3, the mean of transformed score was 54.00 for incremental hemodialysis group and 50.82 for regular hemodialysis group (p=0.503). For domain 4, the mean of transformed score was 51.51 for incremental hemodialysis group and 48.00 for regular hemodialysis group (p=0.396).

DISCUSSION

In our country, the conventional thrice a week and even twice a week hemodialysis sessions at the time of initiation are usually not accepted by the patients and their relatives. Hence, usually patients are initiated with lesser frequencies of hemodialysis sessions. In this study, lesser frequencies than twice a week hemodialysis sessions were considered as incremental hemodialysis group. They were transitioned to more frequent hemodialysis sessions, when clinically indicated. After a follow up of 6 months, the outcomes of incremental hemodialysis and twice a week hemodialysis groups were compared.

This study was an observational prospective cohort study, conducted in the Department of Nephrology, Dayanand Medical College and Hospital, Ludhiana. Baseline characteristics were recorded for all patients, which included age, gender, height, pre-dialysis weight at dialysis initiation, cause of underlying renal disease, routine haematological and biochemical data. Comorbidities were defined at hemodialysis initiation including diabetic status, cardiac disease, peripheral vascular disease, and other illness. At baseline, no statistically significant difference between the study groups were noted in terms regarding demographics, basic diseases causing ESRD, hemodynamic indices, biochemical parameters, and residual renal function. In various studies, it has been concluded that patients with higher residual renal function may require less than conventional three HD sessions per week at the initiation of dialysis. Twice-weekly hemodialysis schedule is safe and cost-effective and may have additional benefit in maintaining the residual renal function.

Till now, maximum studies have been conducted to compare the outcomes of twice weekly hemodialysis versus conventional thrice weekly hemodialysis. This study has been conducted to know the outcome of even lesser frequency of hemodialysis sessions. In this study impact of twice weekly hemodialysis has been compared to lesser frequency hemodialysis, if needed, transitioned to more frequent

hemodialysis session, which has been considered as incremental hemodialysis.

The outcomes of this study were examined and compared at the end of a 6-month follow-up period following the initiation of hemodialysis. The primary outcome assessed was all-cause mortality, while secondary outcomes encompassed residual renal function, the quality of life (QoL) index, the incidence of transitioning to more frequent hemodialysis, and any morbidity, including the number of hospitalization episodes.

AGE DISTRIBUTION

In this study, the mean age of patients in the incremental group was 52.09 years, while in the regular twice-weekly hemodialysis group, it was 50.92 years. However, the observed difference in age between the two groups was not found to be statistically significant. Similar findings were reported in previous studies. Ahmed et al.[40] found a mean age of 43.4 years in the incremental hemodialysis group and 44.3 years in the conventional hemodialysis group. Chauhan et al.[41] enrolled patients with an average age of 56.02 ± 9.89 years. Hwang et al.[42] reported a mean age of 61.0 ± 14.2 years for the twice-weekly hemodialysis group and 59.7 ± 11.6 years for the thrice-weekly hemodialysis group. Kamal et al.[43] found mean ages of 59 ± 15 years and 62 ± 15 years in the twice-weekly hemodialysis group and conventional hemodialysis group, respectively. These studies collectively indicate that the mean age in this study is comparable to previous research.

GENDER DISTRIBUTION

In this study out of total 68 patients, 52 patients (76.5%) were male, and 16 patients (23.5%) were female. A similar study conducted by Kamal et al [43], the percentage of female was 34% in twice weekly hemodialysis group, whereas 27% in conventional hemodialysis group. In a study conducted by Hwang et al[42], 66% and 83% were male in twice weekly hemodialysis group and conventional thrice weekly hemodialysis group. In this study, 23.3 % were female among incremental hemodialysis group, whereas 24% in regular twice weekly

hemodialysis group. The gender distribution was comparable to the above studies.

ETIOLOGY OF ESRD

In this observational study, most common etiology for ESRD was diabetes mellitus type 2 (50%), followed by hypertension (33.8%), chronic glomerulonephritis (8.8%), autosomal dominant polycystic kidney disease (2.9%), chronic analgesic abuse (1.5%), obstructive nephropathy (1.5%) and renal cortical necrosis (1.5%).

Similar study done by Hwang et al [42] showed diabetes as the cause for ESRD in 52% in twice weekly hemodialysis group and 69% in thrice weekly hemodialysis group. Hypertension was the 2nd most common primary renal disease accounting 31% in twice weekly hemodialysis group and 30% in thrice weekly haemodialysis group. 19% patient in twice weekly hemodialysis were having ESRD because of glomerulonephritis, whereas it was 16% in thrice weekly hemodialysis group.

According to the Kamal et al. study,[43] the leading causes for ESRD was diabetes 19% and 24% respectively in twice weekly hemodialysis group and thrice weekly hemodialysis group. It was followed by CGN (14% and 13%), CIN (8% and 4%) and PCKD (10% and 5%) in twice weekly hemodialysis group and thrice weekly hemodialysis group. Only 8% and 13% of ESRD respectively in twice weekly and thrice weekly hemodialysis group were due to hypertension. In a randomised control study by Vilar et al [44] also found Diabetic nephropathy was involved in 26.9% of ESRD in standard group and 48.3% in incremental hemodialysis group. Renovascular disease was implicated in 7.7% and 3.4%, adult polycystic kidney disease in 11.5% and 20.7%, Hypertension in 7.7% and 3.4%, chronic glomerulonephritis in 7.7% and 13.8% for standard hemodialysis group and incremental hemodialysis group respectively. In the present study also, in both the groups the most common cause for ESRD was diabetes mellitus type 2, accounting 22 patients (51.2%) in incremental group and 12 patients

(48%) in regular group. 2nd most common cause was found to be hypertension causing 27.9% of ESRD in incremental hemodialysis group and 44% in regular twice weekly hemodialysis group. Other causes are found to be ADPKD, CGN, chronic analgesic abuse associated CIN, obstructive nephropathy and renal cortical necrosis.

PRIMARY OUTCOME

In the present observation prospective cohort study, the primary outcome studied was all cause mortality at the end of 6 months follow-up period. Five patients (7.4%), out of total 68 patients, died during 6 months follow-up due to various reasons. The mortality in the incremental hemodialysis group, was lesser (2/43 patients- 4.7%) than twice weekly hemodialysis group (3/24-12%), but the difference was not statistically significant (p=0.263). In our study, out of 5 patients, 2 patients died due to unexplained sudden cardiac arrest at home, 1 patients each died because of cardiogenic shock, covid pneumonitis and extrapulmonary Koch's.

In a randomised control study by Vilar et al. incremental hemodialysis initiation: randomized trial [44], they found that deaths, n (events per person-years) were 3 (0.18%) in standard hemodialysis group and 3 (0.13%) in incremental hemodialysis group for 12 months follow up.

In a study done by Hwang et al [42], the number of patient deaths was 3 (2.2%) in patients with RKF undergoing thrice-weekly HD, 8 (7.1%) in patients with RKF undergoing twice-weekly HD, and 59 (13.6%) in patients without RKF undergoing thrice-weekly HD (P < 0.001). The cumulative event rate for patient death at the 3-year follow-up was 11.8% in patients with RKF receiving twice-weekly HD, which was not higher than that in patients without RKF receiving thrice-weekly HD (16.0%; P = 0.57). Of the 3 groups, patients with RKF undergoing thrice-weekly HD had the lowest cumulative event rate for patient death (6.8%, P = 0.002).

Mathew et al.[27] examined mortality risk across a spectrum of hemodialysis frequency schedules among a matched cohort of incident hemodialysis patients receiving incremental, conventional, and frequent treatments. After accounting for residual kidney function, patients receiving incremental hemodialysis were found to have a similar mortality risk vs. those receiving conventional schedules.

In a cohort study conducted by Chen et al [34] found that incremental hemodialysis was significantly associated with preservation of RKF and fewer complications of arteriovenous access. Patients receiving incremental hemodialysis were found to have a similar hospitalization, death and the composite outcome as patients receiving conventional hemodialysis.

In a recent US longitudinal study, mortality was not increased in patients who received twice-weekly HD for at least 6 weeks in the first 3 months provided baseline RKF was >3 ml/min per 1.73 m2. [24]

In a meta-analysis of 18 studies, mortality risk did not differ significantly between groups receiving incremental hemodialysis (1-2 sessions per week) and conventional hemodialysis (at least 3 sessions per week), reported in Nephrology Dialysis Transplantation. [37]

A study done by Mukherjee et al [45] on Indian population, a total of 117 patients were included, of which 35 (29.91%) and 82 (70.08%) were on twice a week dialysis (2x) and thrice a week (3x) dialysis, respectively. They found the number of deaths were 4 and 17, respectively, in the 2x and 3x group respectively. Of the four deaths in the 2x group, 2 each were due to a cardiac event and 2 were sudden cardiac deaths (SCDs). Of the 17 deaths in the 3x group, 4 were cardiac events, 6 were SCDs, 4 died due to sepsis, and 3 deaths were due to other causes (liver failure, discontinuation of dialysis, and noncompliance).

SECONDARY OUTCOMES

RESIDUAL RENAL FUNCTION

In this observational study, the mean urine volumes in 12 hours at the time of initiation were 390.70 ml and 294.00 ml in the incremental hemodialysis group and regular twice-weekly hemodialysis group, respectively. After 6 months, the mean urine volumes decreased to 242.93 ml in the incremental hemodialysis group and 65.91 ml in the regular twice-weekly hemodialysis group, showing a significant decline in later group (p=0.001). Additionally, among the incremental hemodialysis group, the mean baseline urea clearance was 1.78 ml/min, while in the regular twice-weekly hemodialysis group, it was 1.45 ml/min. After 6 months, the mean urea clearance decreased to 1.11 ml/min in the incremental hemodialysis group and 0.25 ml/min in the regular hemodialysis group, with a significant difference (p=0.001).

Moreover, the baseline mean creatinine clearance was 1.60 ml/min in the incremental hemodialysis group and 1.45 ml/min in the regular hemodialysis group. At the end of 6 months, the mean creatinine clearance was 1.04 ml/min in the incremental hemodialysis group and 0.23 ml/min in the regular hemodialysis group, demonstrating a significant difference (p=0.001). Similarly, the baseline residual renal function, calculated as the mean of urea clearance and creatinine clearance, was 1.68 ml/min in the incremental hemodialysis group and 1.40 ml/min in the regular hemodialysis group. After 6 months, the residual renal function decreased to 1.07 ml/min in the incremental hemodialysis group and 0.24 ml/min in the regular hemodialysis group, with a significant difference (p=0.001).

Furthermore, the study revealed that both groups experienced more deterioration in residual renal function among diabetic patients.

In a large retrospective longitudinal cohort by Obi et al. [46], 23,645 patients on maintenance HD with available RKF data during the first 91 days (or quarter) of dialysis, and who survived the first year after dialysis, whereas 8,068 patients with conventional HD regimen were

matched and compared to 351 patients with the incremental regimen. In this matched cohort, both renal urea clearance and urine volume (UV) showed a significantly slower decline over time in the incremental versus conventional regimens (P-values of <0.001 for both). This was consistent with the findings in our study, where a significant difference was recorded at the end of 6 months.

In the study by Hwang et al. [47], dialysis adequacy was assessed as renal Kt/V at all follow-up points and was significantly greater in patients with RKF receiving twice-weekly HD than in patients with or without RKF receiving thrice-weekly HD. These findings suggest that twice-weekly HD treatment can achieve a sufficient dialysis dose, like that of thrice-weekly HD treatment if RKF is appropriately preserved. In the present study even lesser frequency of hemodialysis session was associated with better preservation of residual renal function.

In the study by Lin et al.[15] the twice-weekly group had higher residual UOP, higher residual GFR, and higher weekly renal Kt/V, while the thrice-weekly group experienced a faster decline in UOP and renal creatinine clearance/month.

Caria et al.[52] in a non-RCT study found that regarding rate of loss of RKF (mL/min/month), rate of loss was lower in the I-HD group compared to the standard HD group (–0.13 vs –1.53).

Chen et al.[34] in an observational study found that I-HD reduced the risks of RKF loss (HR = 0.33)

In a study conducted by Chen et al [34], in a mean follow-up duration of 13.4 ± 7.9 months, the decline rate of urine output in the incremental group was significantly lower than that in the conventional group [−33.4 mL/month vs −70.4 mL/month, P < 0.001].

In the above studies, they have shown that residual renal function was more preserved in twice weekly hemodialysis group, when compared to conventional thrice weekly hemodialysis group. This present study was to compare the outcome between twice weekly haemodialysis

group and lesser frequent hemodialysis group (considered as incremental hemodialysis group). We found that residual renal function was better preserved in even lesser frequency haemodialysis group, as compared to twice weekly regular hemodialysis group.

MORBIDITY INCLUDING NUMBER OF HOSPITALISATION EPISODES

In this study, the most common cause of hospitalisation was found to be volume overload (35.3%). It was followed by uremic symptoms (14.7%). Other causes were found to be accelerated hypertension, CRBSI (catheter related blood stream infection), CVA (cerebrovascular accident), DKA (diabetic ketoacidosis), LRTI with fungal sepsis with herpes zoster infection, hyponatremia, pericardial effusion, persistent hyperkalemia, pulmonary tuberculosis, severe anemia, tuberculous lymphadenitis, urosepsis, volume overload with pericardial effusion, volume overload with uremic symptoms, volume overload with CVA (infarct) with extra pulmonary Koch's. These accounted for 2.9% each.

The mean admission rate was 0.65 in the incremental hemodialysis group, whereas it was 0.56 in the regular twice weekly hemodialysis group. The difference was not found to be statistically significant (p=0.625).

The study conducted by Ahmed et al [40] showed following results

Hospital admission among the studied groups after 6 months:

status	Incremental (n=25)	Conventional (n=25)	P value
admission	2(8%)	5 (20%)	0.417
No admission	23 (92.0%)	20 (80.0%)	

In the present study also the difference between no. of admissions in incremental hemodialysis group and twice weekly hemodialysis group was not statistically significant.

The study conducted by Hyeon Seok Hwang et al [42] found that the patients with RKF undergoing thrice-weekly HD had 6 (4.4%) CVE (cardiovascular events), and 8 (7.1%) and 73 (16.8%) of CVE was observed in patients with RKF receiving twice-weekly HD and in patients without RKF receiving thrice-weekly HD, respectively ($P < 0.001$). The lowest cumulative event rate for CVE hospitalization was observed in patients with RKF receiving thrice-weekly HD ($P = 0.01$). In our study the most common cause of hospitalization was volume overload, followed by uremic symptoms, but, it was not statistically significant.

In a study by Chen W et al [34] conducted on Incident hemodialysis patients from Huashan Hospital in Shanghai, China, over the period of 2012 to 2019, found that the incidence rate of all-cause hospitalization was lower in the incremental group than in the conventional group under the unadjusted negative binomial model ($P = 0.03$), but this association was not significant under the adjusted negative binomial model. However, in the present study, the no. of admissions was lower in twice regular hemodialysis group as compared to incremental hemodialysis group. In our study also, it was not statistically significant.

In Indian scenario a study conducted by Mukherjee et al [45] from June 1, 2012, to December 31, 2013. A total of 117 patients were included, of which 35 (29.91%) and 82 (70.08%) were on twice a week dialysis (2x) and thrice a week (3x) dialysis, respectively. They found the number of hospitalizations in the 2x and 3x groups were 14 and 46, respectively, over the study period. The hospitalization rates per patient year were 0.39 and 0.49 in the 2x and 3x groups, respectively, with rate ratio of 0.79 (0.40–1.57).

In the present study, however, the mean value of total no. of admissions was 0.65 in the incremental hemodialysis group, whereas it was 0.56 in the regular twice weekly hemodialysis group, reflecting more admissions in the incremental hemodialysis group. The difference was not statistically significant. The result of the present study is

comparable to above study. Any specified factor or characteristics causing more admissions could not be determined.

INCIDENCE OF TRANSITION TO MORE FREQUENT HEMODIALYSIS

In this prospective cohort study following trends of frequency of hemodialysis have been seen:

Trend	No. of patients	Percentage
From once in 2 weeks to once in 10 days	3	4.4
From once in 2 weeks to once a week	2	2.9
From once in 10 days to once a week	7	10.3
From once in 10 days to twice a week	1	1.5
Once in 10 days	2	2.9
Once in 5 days to twice a week	1	1.5
Once a week	6	8.8
Once a week to twice a week	14	20.6
Twice a week to thrice a week	7	10.3
Twice a week	25	36.8

Initially, we enrolled 71 patients, initiated on maintenance hemodialysis from August 2021 to May 2022. 3 patients were lost to follow up, 68 patients were followed for 6 months. Out of 68 patients, 32 patients (47.1%) were initiated on regular twice weekly hemodialysis and 36 patients (52.9%) were initiated on incremental hemodialysis. Out of 32 patients, who were initiated on regular twice weekly hemodialysis, 7 patients were transitioned to thrice a week hemodialysis. They were included in incremental hemodialysis group for study. So, in this observational study only 25 patients were left among regular twice

weekly hemodialysis group for comparison. Out of total 43 patients among incremental hemodialysis group, 2 patients (2.9%) were initiated on maintenance hemodialysis with once in 10 days and remained with the same frequency till the end of 6 months. 6 patients (8.8%) were initiated on once a week hemodialysis session, remained with the once a week hemodialysis session till the end of 6 months. 3 patients (4.4%) transitioned from once in 2 weeks to once in 10 days, 2 patients (2.9%) from once in 2 weeks to once a week, 7 patients (10.3%) from once in 10 days to once a week, 1 patient (1.5%) from once in 10 days to twice a week, 1 patient (1.5%) from once in 5 days to twice a week, 14 patients (20.6%) from once a week to twice a week, and 7 patients (10.3%) from twice a week to thrice a week. The most common transition was seen to be once a week session to twice a week session. The most common indication for transition to more frequent hemodialysis was uremic symptoms observed in 17 cases (27.4%) followed by volume overload (interdialytic weight gain) which was observed in 14 cases (22.6%) and persistent hyperkalemia, found in 1 patient (1.6%).

Not many studies have been done regarding incremental hemodialysis transitioned to more frequent hemodialysis. Murea et al [49] in their pilot study, they had compared the outcome of twice weekly hemodialysis (n=23) and thrice weekly hemodialysis (n=25). They had found that 9% cross over from twice weekly haemodialysis to thrice weekly haemodialysis over 6 months. Indications of transition were both clinical and biochemical parameters. In this study also, there is a transition of 10.3%, from twice weekly haemodialysis to thrice weekly haemodialysis.

Ghahremani-Ghajar et al [50] had conducted a retrospective analysis of 13 incident ESRD patients who initiated incremental twice-weekly hemodialysis in the outpatient setting over the contemporary period of January 2015 to August 2016 at the University California Irvine Dialysis Center in Orange, California. Among these patients, eight were transitioned to conventional thrice-weekly hemodialysis, whereas the

remaining five patients have continued to receive twice-weekly hemodialysis. The duration of the reporting was January 2015 to August 2016 (20 months). The two primary indications for transitioning to thrice-weekly hemodialysis were excessive interdialytic weight gain (n=4) and inability to achieve adequate total clearance (n=4). The indications of transition to more frequent hemodialysis in this study also were volume overload (interdialytic weight gain) and uremic symptoms.

Jaques et al [51], in their prospective study, included 313 patients with 234 starting on HD (166 TW-HD and 68 I-HD) and 79 on PD. At the end of the study, 10 were still on I-HD while 45 transitioned to TW-HD after a mean duration of 9.8 ± 9.1 months. Patients who stayed on I-HD were less frequently diabetics (P = .007). The reasons for transition were low urine output (reflection of residual renal function), and overall clinical condition, uremic symptoms, volume control (UF >10 mL/kg/h), blood pressure control, anaemia, electrolytes and acid–base status. The results were consistent to the present study.

All the studies mentioned above have defined twice weekly as incremental hemodialysis, whereas in the present study, incremental hemodialysis group included even lesser frequencies of hemodialysis sessions. The outcomes cannot be compared completely. However, the transition from twice weekly hemodialysis to thrice weekly hemodialysis are being consistent to the mentioned studies.

QUALITY OF LIFE

WHOQOL-BREF scoring system includes 4 domains, physical health, psychological, social relationships, and environment. As per WHOQOL-BREF scoring system at the time of initiation of maintenance hemodialysis (baseline) mean of all the domains were comparable between both the groups at the initiation of the study and the difference was not significant. Similarly, two transformed scores (4-20 and 0-100) of all 4 domains were comparable.

To date, the effects of incrementally prescribed twice-weekly HD and residual kidney function on health related quality of life remain poorly

delineated. There are not many studies, comparing the quality of life between incremental and conventional hemodialysis group.

In a prospective cohort study of 734 patients with incident KDRD (kidney-dysfunction requiring dialysis) in the US, those with urine output at baseline (defned as producing at least 250mL/day) reported overall better QOL (P=0.05) and less dietary restriction (P=0.05).[16]

In one study done by Bieber B et al [19] in China, quality of life scores did not differ between the twice-weekly and thrice-weekly HD groups.

Chauhan et al [52] in their study where, 50 patients were randomized into the study group A and control group B. 25 patients in study group A, standardized Kt/V was measured weekly. The length of the dialysis was prolonged if required, to meet a target of two for standardized Kt/V. In the control group, no monitoring of Kt/V was done. After 6 months, clinical parameters, Hb, serum albumin and the QoL questionnaire along with the measures of adequacy of hemodialysis were recorded. They found out that there was a significant improvement in WHO QoL score in study group (17.2) as compared to the control group (2.24) with $P < 0.05$ and Z score of 4.34. The improvement was largely seen in domains of - Physical and psychological. Other two domains – social and environmental remained unaffected.

In the present study also, at the end of 6 months, raw scores and corresponding transformed scores of both incremental hemodialysis group and twice regular weekly hemodialysis group improved. But the scores for quality of life as per WHOQOL-BREF of increment hemodialysis group were relatively better as compared to twice weekly hemodialysis group. However, the differences were not statistically significant.

BIOCHEMICAL PARAMETERS

HEMOGLOBIN, CALCIUM, PHOSPHORUS, PTH, ALBUMIN

Mean hemoglobin concentration at the time of initiation of hemodialysis was 9.06 gm/dl in the incremental hemodialysis group

and 8.92 gm/dl in the regular hemodialysis group. At the end of 6 months mean hemoglobin concentration was 8.60 gm/dl and 8.39 gm/dl in incremental hemodialysis group and regular twice weekly hemodialysis group respectively. The difference was not found to be significant (p=0.502).

However, in the study by Obi and colleagues [24], it was reported that patients treated with the incremental regimen had lower concentrations of hemoglobin, but these differences were attenuated over time. This was inconsistent with our study, where regular hemodialysis group had lower baseline hemoglobin concentration and the differences had been seen between the two groups at the end of the study. However, the difference was not found to be significant at the end of 6 months.

Hwang et al [42], in their prospective study found hemoglobin (g/dL), 10.5 +/- 1.3 and 10.8 +/- 1.3 in incremental hemodialysis and thrice weekly hemodialysis group (p=0.1) at the end of 12 months. It was consistent with the results of the present study.

Baseline serum calcium concentration at the time of initiation was 7.80 and 7.88 mg/dl in incremental hemodialysis group and regular twice weekly hemodialysis group respectively. At the end of 6 months, it was found to be 7.66 mg/dl and 7.60 mg/dl in incremental hemodialysis group and regular twice weekly hemodialysis group respectively. The difference was not found to be significant (p=0.768). In the study conducted by Hwang et al [42], the serum bicarbonate level at 24-month follow-up and calcium phosphate product at 36-month follow-up was significantly lower in patients with RKF receiving twice-weekly HD than patients without RKF receiving thrice-weekly HD. A prospective study conducted by Vilar et al [44], found that there was no significant difference of calcium level between incremental hemodialysis and conventional hemodialysis groups. These results were consistent with the present study.

In the present study, mean serum phosphorus concentration was 5.72 mg/dl in incremental hemodialysis group and 5.48 mg/ dl in regular

twice weekly hemodialysis group, at the time of initiation. At the end of 6 month mean phosphorus concentration was found to be 5.50 mg/dl and 5.31 mg/dl in incremental hemodialysis group and regular twice weekly hemodialysis group respectively. The difference was not found to be significant (p=0.330).

In a study done by Obi Y [46] serum phosphorus levels, at each visit, in the incremental group and the conventional group, separately, showed no significant differences in both groups. Also, there were no significant differences between both groups, at each follow-up.

In a single-center retrospective study by Kaja et al[53], conducted over 20 years, patients who had twice-weekly sessions for 3 months during the 12 months following initiation of twice weekly HD were identified for comparison with patients who dialyzed thrice-weekly. It was found that there were no significant differences between both groups in phosphorus levels. This was in concordance with the findings in our study, but it's worth mentioning that this study considered patients in the twice-weekly group if they continued for at least three months on the twice-weekly regimen in the first year after starting the regimen. In my study in the incremental group total no. of HD sessions were significantly lower than that of regular twice weekly hemodialysis group. In this regard, this adds more weight to my study.

Mean serum PTH concentration at the time of initiation was 372.05 pg/ml in incremental hemodialysis group and it was 400.80 pg/ml in regular twice weekly hemodialysis group. At the end of 6 months, it was found to be 409.34 pg/ml and 458.05 pg/ml in incremental hemodialysis group and regular twice weekly hemodialysis group respectively. The difference was not found to be significant (p=0.238). However, in the study by Obi and colleagues[46], there was a significant difference, which remained significant across the following quarters irrespective of adjustment models. Also, patients treated with the incremental regimen had less dialysis frequency, shorter dialysis time, lower concentrations of hemoglobin and serum corrected calcium, and

higher serum ferritin concentrations at baseline, but these differences were attenuated over time. Regarding PTH levels in each group separately, at follow-up visits, there were no significant differences. Also, on comparing the two groups at each follow-up, there were no significant differences. In the study mentioned by Zhang et al,[22] iPTH showed no difference between the two groups at baseline and at follow up, as did our study.

Mean serum albumin level was at the initiation of the study was 3.41 gm/dl in incremental hemodialysis group and 3.22 gm/dl in the regular hemodialysis group. At the end of 6 months, it was 3.18 gm/dl and 3.37 gm/dl in the incremental and regular hemodialysis group respectively. The difference was not significant (p=0.385).

In a study by Zhang and colleagues[22], the main biochemical and clinical measures such as serum albumin, total cholesterol, BMI, showed no significant differences between the two groups at baseline. This was consistent with our findings.

A prospective cohort study by Hwang and colleagues[47], was conducted on 685 regular ESRD cohorts above 18 years old receiving HD for at least 3 months. Patients were divided into 3 groups; twice weekly HD with RKF, thrice-weekly HD with RKF, and thrice-weekly HD without RKF, with RKF was defined as the production of more than 100 mL/day of urine. In this study, the hemoglobin level and serum level of albumin showed no significant differences during the entire follow-up, which was consistent with our study.

We found that the patients among age group 51-60 years, more no. of patients were transitioned to more frequent sessions of hemodialysis. However, in this study maximum no. of patients also were present in this age group. So, it may be the reason for accounting more no. of patients being transitioned to more frequent hemodialysis sessions. The patients with basic disease DKD were more frequently found to be transitioned from twice a week to thrice a week hemodialysis sessions. Similarly, more hypertensive patients were found to be transitioned to

once a week to twice a week hemodialysis sessions. No differences were seen on gender basis. Other characteristics or factors could not be determined, which may be the reasons for lesser or greater chances for transition to more frequent hemodialysis.

LIMITATIONS

- Due to the relatively short follow-up period of only 6 months for each patient, the study's duration may be considered insufficient to draw definitive conclusions.
- This study is a single centre observational study. Thus, the inherent limitations of monocentric trials should be kept in mind, when analysing the data.
- During the analysis of the data, it is important to keep in mind that the transition to more frequent hemodialysis was only initiated when clinically indicated, therefore, other biochemical parameters and residual renal function should be taken into consideration.
- In this study, the calculation of the adequacy of each session was not possible, leading to a potential limitation where the dose of dialysis session might be inadequate for certain patients.
- Although we had enrolled 71 patients, the sample size in both the groups were small. Larger sample sizes are required to definitively evaluate different outcomes between the groups.

SUMMARY AND CONCLUSION

- It was an observational prospective cohort hospital-based study to know the effectiveness and outcomes of incremental hemodialysis.
- Total 68 patients were followed for 6 months; 43 patients were initiated on incremental hemodialysis and 25 patients on regular twice weekly hemodialysis.
- Mean age in the incremental group was 52.09 years and in regular twice weekly hemodialysis group, it was 50.92 years.
- Males were more common in the study, nearly 76% were males.
- Diabetes was the most common cause for ESRD, followed by hypertension.
- The mean of total no. of hemodialysis sessions was 33.44 in incremental hemodialysis group and 47.88 in regular twice weekly hemodialysis group.
- Most common transition to more frequent hemodialysis among incremental hemodialysis group was once a week session to twice a week hemodialysis session.
- Most common indication for more frequent transition was uremic symptoms followed by volume overload (interdialytic weight gain).
- 33 patients (48.5%) required admission. Relatively more admissions were recorded in incremental group. Most common cause for admission was volume overload.
- In incremental hemodialysis group, 2 patients (4.7%) died in regular hemodialysis group 3 patients (12%) died due to various reasons.
- Urea clearance, creatinine clearance, residual renal function and urine output were more preserved in incremental hemodialysis group. It was statistically significant.
- Quality of life, as per WHOQOL-BREF, was relatively better in incremental hemodialysis at the end of 6 months.
- At the end of 6 months, mean hemoglobin concentration was 8.60 gm/dl in incremental hemodialysis group and 8.39 gm/dl in regular hemodialysis group.

- The mean calcium level at the end of 6 months was 7.66 mg/dl and 7.60 mg/dl in incremental and regular twice weekly hemodialysis group respectively.
- There was not statistically difference in Serum phosphorus and PTH level among incremental and regular hemodialysis group at the end of the study.

CONCLUSION:

In the present study, the outcomes of incremental hemodialysis, in terms of mortality, residual renal function, quality of life and biochemical parameters were not found inferior to regular twice weekly hemodialysis. However, morbidity including the no. of admissions was more in incremental hemodialysis group (statistically not significant). In developing country like India, where resources are limited and conventional thrice a week and even twice a week hemodialysis sessions are usually not accepted by the patients and relatives, incremental hemodialysis may be a good option. To prove the sustainability of this study, larger sample size and longer follow up are required.

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KEY TO MASTER CHART

SR No – Serial number

MRD No –Medical record department number

Cm – Centimeter

Kg – Kilogram

BMI – Body mass index

ESRD – End Stage Renal Disease

Yrs. – years

Spo2— Saturated Pulse Oxygen

F – Fahrenheit

JVP—jugular Venous Pulse

SBP – systolic blood pressure

DBP – diastolic blood pressure

Hep B – Hepatitis B

Hep C – Hepatitis C

HIV – Human immunodeficiency virus

ml – Milliliter

ml/min – Milliliter per minute

EF – Ejection fraction

Hb – Hemoglobin

PTH – Parathyroid hormone

Vit D3 – Vitamin D3

TIBC – Total iron binding capacity

SGOT – Serum glutamic – oxaloacetic transaminase

SGPT – Serum glutamic-pyruvic transaminase

ALP – Alkaline phosphatase

no. – number

M – Male

F – Female

CGN – Chronic glomerulonephritis

DM2 – Type 2 Diabetes mellitus

ADPKD – Autosomal dominant polycystic kidney disease

HTN – Hypertension

gp – Group

N – no

Y – Yes

CVA – Cerebrovascular accident

Neg – Negative

B/L – Bilateral

IOL – Intraocular lens

NR – Nonreactive

R – Reactive

CLD – Chronic liver disease

NASH – Nonalcoholic steatohepatitis

COPD – Chronic obstructive pulmonary disease

BPH – Benign prostatic hyperplasia

AV fistula – Arteriovenous fistula

IJV – Internal Jugular Vein

GHK – Global hypokinesia

CAD – coronary artery disease

LV – Left ventricle

% -- percentage

W – week

DKA – Diabetic ketoacidosis

CRBSI – Catheter related blood stream infection

LRTI – lower respiratory tract infection

mmhg – millimeter of mercury

HHD – Hypertensive heart disease

RWMA – Regional wall motion abnormality

LVEF – Left ventricular ejection fraction

gm/dl – Gram per deciliter

mg/dl – milligram per deciliter

mgm/dl – milligram per deciliter

pg/dl – picogram per deciliter

ng/ml – nanogram per milliliter

mcg/dl – microgram per deciliter

T – total

D – direct

I – Indirect

U/L – units per liter

IU/L – International units per liter

SR. NO	PATIENT'S NAME	AGE	SEX	MRD NO.	DATE OF INITIATION OF HEMODIALYSIS	HEIGHT (CM)	WEIGHT (KG)	BMI (kg/m2)	BASIC DISEASE LEADING TO ESRD	disease with duration (YRS)	PAST HISTORY Diabetes	Hypertension	Autoimmune disease	other comorbities	FAMILY HISTORY: +/-	SMOKING	Alcohol	Any other drug abuse	SPO2(%)	Temperature (F)	JVP
1	JPS	19	M	1244420	27-01-2022	170	60	20.76	CGN	3	N	Y	N	N	NEG	N	N	N	98	98.6	Y
2	SK	54	M	1053127	30-12-2021	167	94.6	33.92	DM2	20	Y	Y	N	N	NEG	N	N	N	96	98.8	N
3	BC	44	M	229228	19-01-2022	154	62	26.14	DM2	14	Y	Y	N	N	MOTHER-DIABETIC, FATHER HYPERTENSIVE	N	N	N	91	99	Y
4	BRS	61	M	673574	15-07-2021	174	58	19.16	ADPKD	14	N	Y	N	N	FATHER-HTN	Y	Y	N	98	98	N
5	PK	57	M	831310	09-11-2021	172	68	22.99	DM2	20	Y	Y	N	N	FATHER-DIABETIC	N	N	N	94	98.8	N
6	KS	46	M	1203787	10-11-2021	172	55	18.59	HTN	8	N	Y	N	N	NEG	N	N	N	92	97.6	N
7	AS	64	M	1211653	01-12-2021	156	67	27.53	ADPKD	18	N	Y	N	N	NEG	N	Y	N	95	99	N
8	DM	54	M	1195702	22-10-2021	160	66	25.78	DM2	16	Y	Y	N	CVA	NEG	Y	Y	N	94	99.6	Y
9	MKJ	58	M	1134578	09-07-2021	170	57	19.72	DM2	15	N	Y	N	N	FATHER-DIABETIC AND HYPERTENSIVE	N	Y	N	94	99.2	Y
10	S	60	F	689650	21-02-2022	152	64	27.70	DM2	22	Y	Y	N	N	NEG	N	N	N	96	98.4	N
11	PC	30	M	1028074	07-09-2021	160	83	32.42	CGN	4	N	Y	Y	N	NEG	N	Y	N	97	98.7	N
12	PK	60	F	219409	11-09-2021	150	53	23.56	DM2	17	Y	Y	N	N	NEG	N	N	N	95	99.8	N
13	RK	44	M	1250119	07-02-2022	167	69	24.74	HTN	8	N	Y	N	N	NEG	N	Y	N	95	99	N
14	JS	63	M	1246008	03-01-2022	158	66	26.44	DM2	15	Y	Y	N	N	NEG	N	Y	N	96	98.6	N
15	SJ	65	M	1192628	18-10-2021	170	71	24.57	HTN	22	N	Y	N	N	NEG	N	Y	N	97	99	N
16	GRS	65	M	1267894	16-03-2022	156	50	20.55	HTN	11	N	Y	N	N	NEG	N	N	N	96	98.8	N
17	TR	55	M	1175656	04-01-2022	164	58	21.56	DM2	12	Y	Y	N	N	FATHER-DIABETIC	N	N	N	95	98	N
18	RR	62	F	1065831	30-07-2021	154	52	21.93	DM2	12	Y	Y	N	N	NEG	N	N	N	95	98.6	N
19	RJ	65	M	690248	14-11-2021	168	58	20.55	DM2	16	Y	Y	N	N	NEG	Y	Y	N	96	98	N
20	NBS	42	M	1257617	12-11-2021	170	57	19.72	HTN	8	N	Y	N	N	NEG	N	N	N	94	98.8	N
21	DS	63	M	1251346	10-02-2022	170	108	37.37	DM2	25	Y	Y	N	N	NEG	N	Y	N	96	98	N
22	NJ	62	M	949220	06-08-2021	168	64	22.68	DM2	20	Y	Y	N	N	NEG	N	Y	N	96	99	N
23	PS	45	M	1233991	16-04-2022	174	74	24.44	DM2	16	Y	Y	N	N	MOTHER-DIABETIC	N	Y	N	90	98.8	N
24	BD	38	F	1287480	14-11-2021	156	52	21.37	CGN	6	N	Y	N	N	NEG	N	Y	N	98	98.8	N
25	VS	46	M	432051	04-04-2022	168	65	23.03	CGN	6	N	Y	N	N	NEG	N	N	N	98	97.8	N
26	MS	46	M	160518	17-11-2021	175	73	23.84	RENAL CALCULUS DISEASE (OBSTRUCTIVE NEPHROPATHY)	6	N	Y	N	N	NEG	N	N	N	96	99.2	N
27	ABAS	51	M	1144620	29-10-2021	168	54	19.13	HTN	10	N	Y	N	N	NEG	N	N	N	98	99	N
28	DM	54	M	1195702	22-10-2021	174	66	21.80	DM2	18	Y	Y	N	N	NEG	Y	N	N	97	98.8	N
29	VS	46	M	894227	11-10-2021	176	80	25.83	DM2	12	Y	N	N	N	FATHER - DIABETIC	N	N	N	96	99	N
30	RANI	57	F	1015112	23-04-2022	157	39	15.82	DM2	18	Y	Y	N	N	NEG	N	N	N	96	98.8	N
31	DS	64	M	821548	28-01-2022	174	70	23.12	DM2	15	Y	Y	N	N	FATHER-DIABETIC	N	Y	N	96	97.8	N
32	GS	38	M	1028527	24-05-2022	164	51.5	19.15	HTN	4	N	Y	N	N	NEG	N	Y	N	97	98	N
33	BS	23	M	1086588	17-03-2022	154	50	21.08	HTN	1	N	Y	N	N	NEG	N	N	N	94	98.2	N
34	HK	64	F	1209269	12-05-2022	166	62	22.50	DM2	25	Y	Y	N	CHRONIC ANALGESIC ABUSE	MOTHER-DIABETIC	N	N	N	93	99	N
35	SS	55	M	1335346	05-07-2022	172	100	33.80	HTN	16	N	Y	N	N	NEG	N	Y	N	97	98.4	N
36	JS	56	M	103274	21-12-2021	173	68.5	22.89	DM2	20	Y	Y	N	N	NEG	N	Y	N	95	99	N

SR. NO	PATIENT'S NAME	Pallor	Icterus	Clubbing	Cyanosis	Edema	Lymphadenopathy	Pulse (per minute)	SBP (mmhg)	DBP(mmhg)	Respiratory system	Cardiovascular system	Central nervous system	Abdomen
1	JPS	Y	N	N	N	Y	N	100	170	100	within normal limit	SYSTOLIC MURMUR PRESENT	within normal limit	DISTENDED, SHIFTING DULLNESS PRESENT
2	SK	Y	N	N	N	Y	N	88	160	100	within normal limit	within normal limit	within normal limit	within normal limit
3	BC	Y	N	N	N	Y	Y (CERVICAL)	92	130	70	B/L CREPTS	SYSTOLIC MURMUR PRESENT	within normal limit	DISTENDED
4	BRS	Y	N	N	N	N	N	78	150	78	within normal limit	within normal limit	within normal limit	B/L KIDNEY BALLOTABLE
5	PK	Y	N	N	N	N	N	88	146	80	within normal limit	within normal limit	within normal limit	within normal limit
6	KS	Y	N	N	N	Y	N	90	156	78	within normal limit	within normal limit	within normal limit	within normal limit
7	AS	Y	N	N	N	Y	N	88	160	100	B/L CREPTS	within normal limit	within normal limit	within normal limit
8	DM	Y	N	N	N	Y	N	74	168	96	B/L CREPTS	within normal limit	Left side weakness	within normal limit
9	MKJ	Y	N	Y	N	Y	Y(CERVICAL)	90	150	88	B/L CREPTS	SYSTOLIC MURMUR PRESENT	within normal limit	DISTENDED, SHIFTING DULLNESS PRESENT
10	S	Y	N	N	Y	Y	N	98	160	100	within normal limit	within normal limit	within normal limit	within normal limit
11	PC	Y	N	N	N	Y	Y(CERVICAL)	84	154	80	within normal limit	within normal limit	within normal limit	within normal limit
12	PK	Y	N	N	N	Y	N	88	156	100	within normal limit	within normal limit	within normal limit	within normal limit
13	RK	N	N	N	N	Y	N	84	190	100	within normal limit	within normal limit	within normal limit	within normal limit
14	JS	Y	N	N	N	Y	N	84	160	100	within normal limit	within normal limit	within normal limit	within normal limit
15	SJ	Y	N	N	N	Y	N	86	164	98	within normal limit	within normal limit	within normal limit	within normal limit
16	GRS	Y	N	N	N	Y	N	88	168	100	within normal limit	within normal limit	within normal limit	within normal limit
17	TR	Y	N	N	N	Y	N	86	150	102	within normal limit	within normal limit	within normal limit	within normal limit
18	RR	Y	N	N	N	Y	N	88	150	90	within normal limit	within normal limit	within normal limit	within normal limit
19	RJ	Y	N	N	N	Y	N	84	162	98	within normal limit	within normal limit	within normal limit	within normal limit
20	NBS	Y	N	N	N	Y	N	88	150	96	within normal limit	within normal limit	within normal limit	within normal limit
21	DS	Y	N	N	N	Y	N	80	160	90	within normal limit	within normal limit	within normal limit	DISTENDED, SHIFTING DULLNESS PRESENT
22	NJ	Y	N	N	N	Y	N	78	144	88	within normal limit	within normal limit	within normal limit	within normal limit
23	PS	Y	N	N	N	N	N	88	130	80	B/L CREPTS	within normal limit	within normal limit	within normal limit
24	BD	Y	N	N	N	N	N	86	160	90	within normal limit	within normal limit	within normal limit	within normal limit
25	VS	Y	N	N	N	Y	N	86	150	96	within normal limit	within normal limit	within normal limit	within normal limit
26	MS	Y	N	N	N	Y	N	86	140	90	within normal limit	within normal limit	within normal limit	within normal limit
27	ABAS	Y	N	N	N	Y	N	76	170	100	within normal limit	within normal limit	within normal limit	within normal limit
28	DM	Y	N	N	N	Y	N	92	150	88	within normal limit	within normal limit	within normal limit	within normal limit
29	VS	Y	N	N	N	Y	N	86	128	70	within normal limit	within normal limit	within normal limit	within normal limit
30	RANI	Y	N	N	N	Y	N	100	130	70	B/L CREPTS	within normal limit	within normal limit	within normal limit
31	DS	Y	N	N	N	Y	N	84	156	90	within normal limit	within normal limit	within normal limit	within normal limit
32	GS	Y	N	N	N	N	N	92	160	90	within normal limit	within normal limit	within normal limit	within normal limit
33	BS	Y	N	N	N	Y	N	84	144	90	within normal limit	within normal limit	within normal limit	within normal limit
34	HK	Y	N	N	N	Y	N	80	160	84	within normal limit	within normal limit	within normal limit	within normal limit
35	SS	Y	N	N	N	Y	N	78	150	96	within normal limit	within normal limit	within normal limit	within normal limit
36	JS	Y	N	N	N	Y	N	88	160	90	within normal limit	within normal limit	within normal limit	within normal limit

SR. NO	PATIENT'S NAME	Eye	ENT	Hep B	Hep C	HIV	Other co-morbidities	Baseline_urea clearance (ml/min)	at 3 months_urea clearance(ml/min)	6 month_urea clearance(ml/min)	Baseline_creatinine clearance (ml/min)	at 3 months_creatinine clearance (ml/min)	6 month_creatinine clearance (ml/min)	Baseline_Urine volume (ml in 12 hrs)	at 3 months_Urine volume (ml in 12 hrs)	6 month_Urine volume (ml in 12 hrs)
1	JPS	within normal limit	within normal limit	NR	NR	NR	NO	2.3	1.38	1.2	2.12	1.32	1.24	500	300	300
2	SK	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	Morbid obese	2.26	2.12	1.38	2.21	2.63	2.77	600	400	400
3	BC	B/L PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	0.58	0.13	0.14	0.89	0.35	0.27	250	100	100
4	BRS	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	2.1	1.8	1.4	1.94	1.3	0.9	700	500	500
5	PK	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	2.36	2.1	1.94	2.15	1.6	1.55	450	400	400
6	KS	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	0.54	0.18	0.08	0.55	0.23	0.11	200	100	60
7	AS	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	0.14			0.11			50		
8	DM	B/L PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	2.12	1.83	1.08	1.54	1.42	0.9	500	500	300
9	MKJ	B/L PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	R	NR	NO	2.28	1.41	0.32	2.6	1.32	0.27	300	200	50
10	S	IOL	within normal limit	R	NR	NR	NO	4.1	3.6	3.3	3.3	3.1	2.9	750	600	500
11	PC	within normal limit	within normal limit	NR	NR	NR	NO	1.54	0.192	1.36	1.38	0.81	1.11	500	300	500
12	PK	within normal limit	within normal limit	NR	NR	NR	NO	3.1	0.81	0.31	2.6	0.64	0.28	500	100	50
13	RK	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	3.1	2.5	2.6	2.9	2.3	2.1	600	400	500
14	JS	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	0.56	0.15	0.2	0.98	0.22	0.21	200	50	50
15	SJ	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	1.63	0	0.07	1.52	0	0.02	400	0	25
16	GRS	within normal limit	within normal limit	NR	NR	NR	NO	2.7	2.4	1.8	2.53	2.1	1.5	700	700	600
17	TR	IOL	within normal limit	NR	NR	NR	NO	3.3	2.9	2.7	1.8	2	2.1	500	500	500
18	RR	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	0.56	0.06	0	0.62	0.38	0	200	50	0
19	RJ	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	2.23	2.17	1.82	2.1	1.9	1.76	600	600	500
20	NBS	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	2.02	0	0	1.8	0	0	500	0	0
21	DS	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	MORBID OBESE, CIRRHOSIS	1.34	0	0	1.009	0	0	100	0	0
22	NJ	within normal limit	within normal limit	NR	NR	NR	NO	1.28	0.56	0.12	1.17	0.59	0.2	300	100	50
23	PS	B/L PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	1.23	0.48		0.9	0.3		300	100	
24	BD	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO									
25	VS	within normal limit	within normal limit	NR	NR	NR	NO									
26	MS	within normal limit	within normal limit	NR	NR	NR	NO	0.89	0.68	0.53	0.99	0.54	0.44	400	300	250
27	ABAS	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	0.94	1.13	0.88	1.12	0.96	0.91	400	400	300
28	DM	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	3	1.4	0.23	2.6	1.2	0.2	500	300	50
29	VS	within normal limit	within normal limit	NR	NR	NR	NO	2.12	1.23	0.98	2	0.94	0.92	400	250	250
30	RANI	B/L PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	1.43	0.41	0.11	1.27	0.3	0.09	250	100	25
31	DS	within normal limit	within normal limit	NR	NR	NR	NO	1.12	0	0	0.93	0	0	300	0	0
32	GS	within normal limit	within normal limit	NR	NR	NR	NO	1.06	0.21	0.23	2.01	0.14	0.16	250	50	50
33	BS	within normal limit	within normal limit	NR	NR	NR	NO	1.1	0.3	0.09	1.03	0.24	0.04	300	100	50
34	HK	IOL	within normal limit	NR	NR	NR	NO	2.31	1.92	1.44	2.12	1.71	1.53	600	400	350
35	SS	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	MORBID OBESE									
36	JS	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	3.47	1.71	1.43	2.08	1.43	1.21	600	300	200

SR. NO	PATIENT'S NAME	Baseline_Residual renal function (ml/min)_	at 3 months_Residual renal function (ml/min)_	6 month_Residual renal function (ml/min)_	vascular access for hemodialysis	baseline 2D echocardiography	at 6 month_2D echocardiography	baseline (normal/abnormal)2D echocardiography	at 6 month (worsened/improved)2D echocardiography
1	JPS	2.21	1.35	1.22	AV Fistula	GHK with EF=30%	GHK with EF 26%	abnormal	worsened
2	SK	2.23	2.37	2.07	AV Fistula	Normal LV size and systolic functio with EF=60%	Normal LV size and systolic functio with EF=60%	normal	same
3	BC	0.73	0.24	0.21	AV Fistula	GHK with EF=38%	GHK with EF 26%	abnormal	worsened
4	BRS	2.02	1.5	1.15	AV Fistula	NORMAL SYSTOLIC FUNCTION EF -60%	GHK WITH EF -54%	normal	worsened
5	PK	2.25	1.85	1.74	AV Fistula	GHK WITH EF 38%	GHK WITH EF 42%	abnormal	improved
6	KS	0.54	0.2	0.09	AV Fistula	NORMAL SYSTOLIC FUNCTION EF -60%	Normal LV size and systolic functio with EF=60%	normal	same
7	AS	0.13			FEMORAL	GHK WITH EF 26%		abnormal	
8	DM	1.83	1.62	1	AV Fistula	Normal LV size and systolic functio with EF=60%	Normal LV size and systolic functio with EF=60%	normal	same
9	MKJ	2.4	1.36	0.25	AV Fistula	GHK WITH EF 40%	RWMA WITH EF 28%	abnormal	worsened
10	S	3.5	3.3	3.1	FEMORAL	Normal LV size and systolic functio with EF=60%	LARGE PERICARDIAL EFFUSION	normal	worsened
11	PC	1.46	0.85	1.23	AV Fistula	GHK WITH EF 50%	GHK WITH EF 42%	abnormal	worsened
12	PK	2.9	0.72	0.29	AV Fistula	CAD WITH EF 34%	CAD WITH EF 26	abnormal	worsened
13	RK	3	2.4	2.3	AV Fistula	Normal LV size and systolic functio with EF=60%	Normal LV size and systolic functio with EF=60%	normal	same
14	JS	0.75	0.19	0.2	AV Fistula	Normal LV size and systolic functio with EF=60%	GHK WITH EF 42%	normal	worsened
15	SJ	1.56	0	0.04	AV Fistula	CAD WITH EF 52%	CAD WITH EF 22%	abnormal	worsened
16	GRS	2.6	2.25	1.65	AV Fistula	Normal LV size and systolic functio with EF=60%	Normal LV size and systolic functio with EF=60%	normal	same
17	TR	2.5	2.4	2.4	AV Fistula	Normal LV size and systolic functio with EF=60%	Normal LV size and systolic functio with EF=60%	normal	same
18	RR	0.59	0.4	0	tunneled ijv dialysis catheter	HHD,EF-52%	GHK EF-24%	abnormal	worsened
19	RJ	2.16	2.04	1.79	AV Fistula	GHK EF -30%	GHK EF -25%	abnormal	worsened
20	NBS	1.9	0	0	AV Fistula	GHK EF -42%	GHK EF 24%	abnormal	worsened
21	DS	1.22	0	0	AV Fistula	GHK EF 48%	GHK EF 32%	abnormal	worsened
22	NJ	1.22	0.58	0.16	AV Fistula	GHK EF 38%	GHK EF 30%	abnormal	worsened
23	PS	1.05	0.39		AV Fistula	GHK EF 46 %		abnormal	
24	BD								
25	VS								
26	MS	0.94	0.61	0.48	AV Fistula	GHK EF 45%	GHK EF 45%	abnormal	same
27	ABAS	1.13	1.14	0.9	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION	NORMAL LV SIZE ,SYSTOLIC FUNCTION EF -60%	normal	same
28	DM	2.8	1.3	0.21	tunneled ijv dialysis catheter	NORMAL LV SIZE AND SYSTOLIC FUNCTION ,LVEF 60 %	NORMAL LV SIZE ,SYSTOLIC FUNCTION EF -60%	normal	same
29	VS	2.06	1.11	0.94	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
30	RANI	1.35	0.36	0.1	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	GHK ,EF 42%	normal	worsened
31	DS	1.01	0	0	AV Fistula	GHK WITH EF48%	GHK WITH EF 30%	abnormal	worsened
32	GS	1.53	0.17	0.2	AV Fistula	GHK WITH EF48%	GHK WITH EF-42%	abnormal	worsened
33	BS	1.06	0.27	0.07	tunneled ijv dialysis catheter	RWMA WITH EF 40%	RWMA WITH EF-38%	abnormal	worsened
34	HK	2.21	1.71	1.53	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
35	SS								
36	JS	2.77	1.57	1.32	AV Fistula	GHK WITH EF 48%	GHK WITH EF 48%	abnormal	same

SR. NO	PATIENT'S NAME	EF BASELINE	EF 6 MONTH	Hb_at initiation (gm/dl)	Hb_at 1 month (gm/dl)	Hb_at 2 month (gm/dl)	Hb_at 3 month (gm/dl)	Hb_at 4 month (gm/dl)	Hb_at 5 month (gm/dl)	Hb_at 6 month (gm/dl)	Serum Calcium_at initiation (mg/dl)	Serum Calcium_at 1 month (mg/dl)	Serum Calcium_at 2 month (mg/dl)	Serum Calcium_at 3 month (mg/dl)	Serum Calcium_at 4 month (mg/dl)	Serum Calcium_at 5 month (mg/dl)	Serum Calcium_at 6 month (mg/dl)
1	JPS	30	26	12	11.3	11.5	11	11.2	10.9	11	6.5	7	7.1	7.4	6.9	7.7	7.3
2	SK	60	60	9.4	9.6	9.1	8.9	8	8.1	8.1	8	7.9	7.2	7.4	7	7.2	7.4
3	BC	38	26	7.1	7.4	8.8	8.2	9	9.1	8.9	8.5	8.8	8.1	8.5	7.9	8.2	8.1
4	BRS	60	54	9.8	9.6	8.9	9.2	8.8	9.4	9	8.8	8.6	8.6	8.7	8.8	9	8.7
5	PK	38	42	9.1	8.8	9.3	8.7	9	9.1	8.8	8.2	8.1	8	7.8	8.2	8	8
6	KS	60	60	7.6	7.1	6.9	7.2	7	7.3	7.1	7.6	8.1	8	7.8	8.2	8.3	8
7	AS	26		9.7	7.8	7.1					7.5	6.8	6.6				
8	DM	60	60	9.1	8.8	8	8.2	7.6	7.8	8.8	7.7	7.4	7.7	7.8	8	8.1	7.6
9	MKJ	40	28	8.4	8.1	7.9	8.2	8.3	8	7.8	11.6	10	9.4	9.7	10.1	9.6	9.5
10	S	60	42	8.4	8.8	8.6	7.9	8.1	8	7.8	7.2	7.1	7	6.8	6.9	7.2	7.1
11	PC	50	42	8.9	9.2	8.7	8.6	9.1	8.8	9	7.4	7.6	8.1	7.5	7.7	7.5	7.6
12	PK	34	26	8.1	7.8	8.2	8	7.9	8.2	8	7.4	7.7	7.1	8	7.2	7.4	7.1
13	RK	60	60	8	8.4	8.2	7.9	8.1	7.8	8	7.8	7.7	7.8	8.1	7.6	6.4	5.7
14	JS	60	42	8.1	8.2	7.9	8	7.8	7.5	7.6	7.1	7	6.8	6.9	6.4	6.3	5.7
15	SJ	52	22	9.6	8.6	8.2	8.2	8	7.6	6.9	8.5	8	7.8	7.8	8.1	7.7	7.6
16	GRS	60	60	12.9	11.8	11	11.4	10.8	10.2	10.4	9.2	8.8	8.6	8.8	8.5	8	8.4
17	TR	60	60	10	11.5	10.8	10	10.2	10	9.8	7.35	7.9	7.7	8.1	7.2	7	7.4
18	RR	52	24	8	8.2	8.3	8.1	7.8	8.1	7.2	7	7.3	6.9	6.8	7.1	6.9	6
19	RJ	30	25	8	8.2	8.4	7.9	7.6	7.2	6.8	7.4	7.2	7.1	6.9	7.2	7.3	7.1
20	NBS	42	24	8.6	8.1	8.4	8	7.9	8.1	8	7.4	7.3	6.8	7.1	7.2	7	6.8
21	DS	48	32	8.2	8.6	8.8	8.4	8.6	8.3	8.1	7.1	7.3	7.4	7	8	7.6	7.2
22	NJ	38	30	7.8	8	8.1	8.2	7.7	8.1	7.8	7.5	6.8	6.4	6	6.8	7.1	6
23	PS	46		8	8.4	7.8	8.2				7.7	8	7.8	8.1			
24	BD																
25	VS																
26	MS	45	46	9	8.8	9.2	9.1	9	8.8	8.7	7.8	7.2	8	7.2	7.6	8	7.8
27	ABAS	60	60	7.2	7.5	8.4	8	7.8	8	7.6	8	8.2	7.8	8	7.6	8	7.8
28	DM	60	60	7.8	7.2	7	7.1	7	6.9	7.1	8.2	7.7	7.6	7.6	7.8	7.7	7.4
29	VS	60	60	9.8	9.4	9	9.1	8.8	8.7	8.8	7.6	7.4	7.4	7.5	7.8	7.2	6.9
30	RANI	60	42	10.6	9.8	9.4	9.9	9	9.4	9.9	9	8.9	9	9.6	9.8	10.3	9.8
31	DS	48	30	7.8	7.6	7.4	7.1	7	7.4	7.1	6.5	7.1	6.8	7.2	6.7	7	7.3
32	GS	48	42	8.7	8	9	8.8	8.6	8.6	8.8	8.1	7.8	7.6	7.8	8	8.1	7.6
33	BS	40	38	8.29	9.3	10.4	8.8	9.2	8.9	8.8	8.6	8.3	8.4	8.5	8.2	8.1	7.9
34	HK	60	60	7.9	8	7.7	7.6	7.8	6.9	7	6.3	6.1	5.9	6.2	6.4	6.1	6.5
35	SS																
36	JS	48	48	8.1	7.8	7.1	6.3	6.9	7.1	7	7.2	8	8.1	7.7	8.1	7.7	8

SR. NO	PATIENT'S NAME	serum phosphorus_at initiation (mg/dl)	serum phosphorus_at 1 month (mg/dl)	serum phosphorus_at 2 month (mg/dl)	serum phosphorus_at 3 month (mg/dl)	serum phosphorus_at 4 month (mg/dl)	serum phosphorus_at 5 month (mg/dl)	serum phosphorus_at 6 month (mg/dl)	serum PTH_at initiation (pg/ml)	serum PTH_at 3 month(pg/ml)	serum PTH_at 6 month(pg/ml)	serum vit D3_at initiation (ng/ml)	serum vit D3_at 3 month(ng/ml)	serum vit D3_at 6 month(ng/ml)	serum ferritin_at initiation(ng/ml)	serum ferritin_at 3 month(ng/ml)	serum ferritin_at 6 month(ng/ml)
1	JPS	8.3	8	7.4	8.1	9	6.3	6.2	403	466	504	13	18	26	200	241	202
2	SK	4.54	5	5.2	5.4	5.4	5.2	5.6	356	302	288	18	24	19	253	304	350
3	BC	5.4	5.8	6.9	5.8	5.4	6	6.2	154	288	256	24.4	18.2	22.2	344	298	300
4	BRS	5.4	6	5.5	6	5.8	5.4	5	253	280	300	43	34	30	250	198	190
5	PK	6.8	6	5.4	6	6.1	5.4	5.8	453	380	450	18	20.1	24	358	310	289
6	KS	4.54	5	5.6	5.2	6	5.1	5.4	453	398	408	34	22	27	534	603	588
7	AS	6.3	5.8	7.1					760			14			670		
8	DM	5.7	6	6.1	6	5.8	6.3	6	353	404	444	23	18	16.8	109.8	103	80
9	MKJ	5.6	6	6.7	6.1	6.3	5.8	5.4	154	118	170	45.3	34.8	54.6	253	348	454
10	S	4.54	5.4	6.2	5.8	5.6	5.2	6	433	338	452	18	21	16	848	1944	776
11	PC	5.45	5.65	5.8	6	5.4	5.3	5.8	388	334	380	17	24	22	435	630	580
12	PK	5.4	5.6	5.5	4.8	5.8	4.9	5.2	455	358	404	18	28	22	358	444	344
13	RK	5.4	6	5.8	5.9	6.1	5.3	5.5	454	388	403	28	18	24	355	404	513
14	JS	5.4	6.2	6	5.4	5.7	5.9	6.3	353	435	466	23	18	21	435	398	356
15	SJ	5.4	5.6	4.8	6	5.3	4.9	5.6	448	546	568	44	34	36	262	322	404
16	GRS	4.5	4.3	5.1	5.4	5.6	4.8	5.1	138	120	134	56	44	48	150	98	122
17	TR	4.9	5.4	5.2	4.9	5.6	5.1	6	358	402	501	19	24	21	352	490	466
18	RR	7.2	6.1	5.6	5.4	5.2	5.6	5.2	535	600	353	24	32	18	635	702	800
19	RJ	6.3	5.8	5.4	5.8	5.9	6.1	5.5	403	504	480	21	16	17	780	804	1107
20	NBS	4.3	5	5.4	4.9	4.3	5.1	4.8	353	445	484	20	24	34	429	604	800
21	DS	7.2	6.8	4	4.8	3.4	5	5.6	545	484	470	30	32	18	178	200	247
22	NJ	5.8	6.1	6.1	7.2	7	7.1	7.4	548	678	703	18	17	14	800	765	923
23	PS	5.8	6.2	6	6.4				453	503		16	12		262	400	
24	BD																
25	VS																
26	MS	6	5.8	6.2	5	5.8	6	5.8	588	540	656	21	20	28	626	676	544
27	ABAS	5.8	5.6	5	4.2	4.6	4.2	3.5	358	403	450	16	24	28	388	352	406
28	DM	7	6.2	6.2	5.8	6.2	5.5	6.2	353	444	503	18	28	30	545	454	560
29	VS	4.54	5	5.5	6	5.4	5.3	5	350	400	563	41	30	18	453	503	588
30	RANI	6.37	5.9	6.4	5.8	6	5.6	5.6	104	68	25	18	20	15	168	203	264
31	DS	6.2	5.8	5.4	5.3	5.7	5.4	5.4	454	503	615	18	14	24	656	750	698
32	GS	5.8	6	5.4	5.6	4.8	5.2	6	928	656	732	13.2	16.2	18	300	342	340
33	BS	4.9	3.8	4.7	3.7	5.2	5	4.7	353	388	402	22	24	28	335	388	402
34	HK	5.4	5.5	5.8	4.9	4.7	5.2	5.4	653	588	592	18	24	16	792	566	838
35	SS																
36	JS	5.8	6	5.4	5.7	6.1	5.4	6	459	353	815	20.8	18	8	343	108	75

SR. NO	PATIENT'S NAME	serum iron_at initiation (mcg/dl)	serum iron_at 3 month(mcg/ml)	serum iron_at 6 month(mcg/dl)	TIBC_at initiation (mcg/dl)	TIBC_at 3 month(mcg/dl)	TIBC_at 6 month(mcg/dl)	serum total bilirubin at initiation (mgm/dl)	serum bilirubin (D) at initiation(mgm/dl)	serum bilirubin (I) at initiation(mgm/dl)	serum bilirubin (T)at 3 month (mgm/dl)	serum bilirubin (D) at 3 month(mgm/dl)	serum bilirubin (I) at 3 month(mgm/dl)	serum bilirubin(T) at 6 month(mgm/dl)	serum bilirubin (D) at 6 month(mgm/dl)	serum bilirubin (I) at 6month(mgm/dl)
1	JPS	28	30	24	160	142	200	0.33	0.08	0.25	0.9	0.6	0.3	0.4	0.3	0.1
2	SK	28	44	22	160	152	204	0.3	0.2	0.1	0.34	0.24	0.1	0.4	0.2	0.2
3	BC	32	30	31	170	204	188	0.4	0.3	0.1	0.38	0.12	0.26	0.61	0.4	0.21
4	BRS	44	54	50	208	184	198	0.3	0.17	0.13	0.28	0.18	0.1	0.31	0.18	0.13
5	PK	31.1	31.3	30	169	198	200	0.45	0.06	0.39	0.52	0.4	0.12	0.7	0.28	0.42
6	KS	24	20	28	200	240	180	0.4	0.1	0.3	0.32	0.11	0.21	0.4	0.28	0.12
7	AS	28			350			0.4	0.3	0.1						
8	DM	58	54	44	160	170	194	0.8	0.4	0.4	1.1	0.5	0.6	1	0.6	0.4
9	MKJ	48	45	32	300	330	420	0.3	0.2	0.1	0.5	0.3	0.2	1.17	0.97	0.2
10	S	38	44	30	127	112	160	0.37	0.06	0.29	0.23	0.07	0.16	0.31	0.18	0.13
11	PC	38	30	24	210	240	254	0.3	0.1	0.2	0.38	0.21	0.17	0.28	0.11	0.17
12	PK	24	30	38	184	166	170	0.3	0.18	0.12	0.28	0.14	0.14	0.32	0.18	0.14
13	RK	18	20	28	180	172	130	0.4	0.1	0.3	0.32	0.18	0.14	0.3	0.1	0.2
14	JS	18	24	30	180	174	192	0.3	0.2	0.1	0.22	0.08	0.14	0.32	0.11	0.21
15	SJ	18	24	14	223	210	254	0.28	0.12	0.16	0.3	0.1	0.2	0.3	0.13	0.17
16	GRS	56	65	58	110	98	104	0.39	0.17	0.22	0.31	0.18	0.13	0.4	0.2	0.2
17	TR	35	51	50	210	170	182	0.4	0.3	0.1	0.32	0.15	0.17	0.52	0.25	0.27
18	RR	36	30	24	156	170	198	0.3	0.1	0.2	0.45	0.23	0.22	0.32	0.14	0.18
19	RJ	56	35	28	150	230	204	0.42	0.12	0.3	0.51	0.21	0.3	0.28	0.16	0.12
20	NBS	88	36	56	164	191	150	0.16	0.11	0.15	0.3	0.12	0.18	0.52	0.12	0.4
21	DS	20	24	20	193	188	204	0.36	0.09	0.27	0.43	0.07	0.36	0.56	0.4	0.16
22	NJ	14	18	22	230	258	242	0.32	0.12	0.2	0.42	0.23	0.19	0.5	0.24	0.16
23	PS	31	32		216	200		0.38	0.2	0.18	0.8	0.5	0.3			
24	BD															
25	VS															
26	MS	33	30	34	168	200	160	0.56	0.21	0.35	0.8	0.3	0.5	0.76	0.56	0.2
27	ABAS	34	30	32	180	204	188	0.27	0.11	0.16	0.3	0.18	0.12	0.7	0.48	0.22
28	DM	37	31	24	150	180	204	0.37	0.07	0.3	0.44	0.24	0.2	0.32	0.16	0.16
29	VS	48	34	32	140	183	203	0.4	0.3	0.1	0.51	0.43	0.08	0.23	0.11	0.12
30	RANI	56	64	58	146	164	198	0.57	0.24	0.33	0.6	0.32	0.28	0.54	0.3	0.24
31	DS	18	22	20	180	170	186	0.3	0.1	0.2	0.48	0.12	0.36	0.4	0.2	0.2
32	GS	31	22.3	26.8	302	340	324	0.7	0.4	0.3	0.21	0.1	0.11	0.45	0.21	0.24
33	BS	155	58	45	219	301	288	0.44	0.06	0.38	0.42	0.12	0.3	0.51	0.23	0.28
34	HK	16	15	22	230	246	212	0.37	0.06	0.31	0.3	0.1	0.2	0.41	0.3	0.11
35	SS															
36	JS	49	100	93	274	300	414	0.35	0.15	0.2	0.41	0.2	0.2	0.31	0.21	0.09

SR. NO	PATIENT'S NAME	SGOT_at initiation (U/L)	SGOT_at 3 month (U/L)	SGOT_at 6 month (U/L)	SGPT_at initiation (U/L)	SGPT_at 3 month (U/L)	SGPT_at 6 month (U/L)	ALP_at initiation (IU/L)	ALP_at 3 month (IU/L)	ALP_at 6 month (IU/L)	Serum total protein_at initiation (gm/dl)	Serum total protein_at 3 month(gm/dl)	Serum total protein_at 6 month(gm/dl)	Serum albumin_at initiation(gm/dl)	Serum albumin_at 3 month(gm/dl)	Serum albumin_at 6 month(gm/dl)
1	JPS	25	12	13	20	11	12	97	86	88	7	6.8	6.4	4.51	4	3.8
2	SK	12	10	13	11	9	10	156	98	104	5.4	5.8	5.9	3.1	3.3	3.2
3	BC	13	12	16	10	8	12	222	168	150	6.4	6	6.1	3.79	3.2	3.4
4	BRS	28	18	12	12	20	14	132	86	103	6.4	6.8	6.4	3.1	3.5	3.3
5	PK	12	19	14	10	10	12	58	71	80	7.6	7.5	7.4	3.44	3.6	3.6
6	KS	12	14	12	10	10	12	156	98	134	5.8	6	6.3	3.6	3.8	3.8
7	AS	12			10			196			4.6			1.7		
8	DM	13	20	23	18	22	20	86	89	63	5.8	5.7	6	3.6	3.5	3.57
9	MKJ	41	30	62	15	13	27	80	130	110	6.3	6	5.8	3.4	3	3
10	S	19	20	24	19	10	14	169	196	155	4.5	5.9	5.8	3.14	2.3	2.1
11	PC	12	14	18	10	8	10	138	156	134	6.3	6	5.8	3.1	3.2	2.7
12	PK	12	18	13	10	8	13	196	180	158	6.1	5.8	5.6	3.8	3.6	3.3
13	RK	14	13	12	12	10	11	180	156	108	6.3	6.4	6	3	3.3	3.1
14	JS	12	13	18	10	10	17	196	148	130	6.8	6.7	6.1	3.1	3.2	3
15	SJ	12	12	18	10	14	10	156	140	156	6.6	6.2	5.8	3.1	2.8	2.6
16	GRS	25	18	28	26	10	20	192	2.4	235	8.4	8	7.6	4.22	4	3.8
17	TR	15	18	22	9	17	20	90	112	134	6.5	6.8	6.2	3.9	3.3	3.2
18	RR	18	24	20	10	12	14	190	188	162	5.5	6.2	5.8	2.1	2.5	2.2
19	RJ	12	24	28	10	15	20	196	154	140	6	5.4	5.8	3.1	3	2.9
20	NBS	48	28	32	19	20	30	196	156	148	5.8	5.4	5	2.16	1.8	1.7
21	DS	9	13	14	7	3	9	97	78	104	5.9	5.6	5.4	3.18	2.89	2.3
22	NJ	13	18	14	12	8	16	108	120	150	5.1	5.3	5.8	2.9	2.3	2.5
23	PS	26	16		17	12		99	130		7	6.4		3	2.9	
24	BD															
25	VS															
26	MS	11	14	10	12	16	12	176	158	160	5.3	5.5	5.2	3.1	3	3.2
27	ABAS	10	12	10	12	14	12	103	110		7.8	7.4	7.5	3.4	3.3	3.7
28	DM	15	16	20	9	9	12	47	56	88	5.9	5.4	5.8	3.3	3	3.2
29	VS	12	18	12	10	13	12	152	180	176	6.5	6.4	6.1	3.2	3	2.9
30	RANI	36	24	32	19	11	24	74	98	68	8	4.44	7.6	4.2	7	4
31	DS	12	16	28	10	12	18	156	148	185	7.4	7.2	6.6	3.9	4	3.8
32	GS	12	20	18	14	10	9	158	210	188	6.4	6.2	6.6	3	2.8	3.2
33	BS	7	7	12	25	24	10	556	603	508	5.3	6.8	6.3	3.25	3.59	3.4
34	HK	12	24	5	10	18	17	156	188	130	6.9	7.1	7.2	3.1	3.4	3.2
35	SS															
36	JS	24	17	21	20	18	19	103	108	154	6.7	6	6.3	3.7	3.1	3.5

SR. NO	PATIENT'S NAME	frequency of hemodialysis per week	Biweekly/ Incrementalmental	Increased/Static	Trend of Increase	transition to more frequent hemodialysis	indication for more frequent transition	no of admissions	cause of admission	Death	Duration of Hemodialysis after which death occurred	total no of dialysis sessions	baseline_domain 1 raw score
1	JPS	once weekly for 3 months, twice weekly for 3 months	Incremental	increase	1/w to 2/w	Yes	volume overload	1	volume overload	N		38	22
2	SK	every 15 days for 3 months, weekly for 3 months	Incremental	increase	0.5w to 1/w	Yes	uremic symptoms	0		N		19	18
3	BC	every 15 days for 3 months, twice weekly for 2 months, once weekly for 1 month	Incremental	increase	0.5w to 1/w	Yes	volume overload	1	volume overload	N		17	18
4	BRS	EVERY 15 DAY-4 MONTHS, EVERY 10 DAY- 2MONTHS	Incremental	increase	0.5w to 1/w	Yes	uremic symptoms	0		N		15	19
5	PK	EVERY 10 DAY - 6 MONTHS	Incremental	static	0.7/w	No		0		N		19	16
6	KS	TWIICE WEEKLY-3 MONTHS, THRICE WEEKLY-3 MONTHS	Incremental	increase	2/w to 3/w	No	uremic symptoms	1	UREMIC SYMPTOMS	N		61	17
7	AS	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		0		Y	EXPIRED AFTER 2 MONTHS DUE TO SUDDEN CARDIAC DEATH	9	8
8	DM	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		1	CVA(INFARCT)	N		48	17
9	MKJ	WEEKLY-4 MONTHS, TWICE WEEKLY-2MONTHS	Incremental	increase	1/w to 2/w	No	uremic symptoms	1	PULMONARY TUBERCULOSIS	N		33	12
10	S	EVERY 10 DAYS- 2 MONTHS, WEEKLY - 4 MONTHS	Incremental	increase	0.7/w to 1/w	Yes	volume overload	1	PERICARDIAL EFFUSION	N		22	18
11	PC	EVERY 10 DAYS- 2 MONTHS, WEEKLY - 4 MONTHS	Incremental	increase	0.7/w to 1/w	Yes	volume overload	1	TUBERCULOUS LYMPHADENITIS	N		23	18
12	PK	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		0		N		52	16
13	RK	WEEKLY-6 MONTHS	Incremental	static	1/w	No		0		N		27	18
14	JS	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		1	CVA(HAEMORRHAGE)	N		53	16
15	SJ	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		1	PERSISTANT HYPERKALEMIA	N		52	18
16	GRS	EVERY 10 DAY-3 MONTHS, WEEKLY-3 MONTHS	Incremental	increase	0.7/w to 1/w	Yes	uremic symptoms	1	UROSEPSIS	N		22	19
17	TR	EVERY 10 DAYS- 3 MONTHS, WEEKLY - 3MONTHS	Incremental	increase	0.7/w to 1/w	Yes	volume overload	0		N		22	17
18	RR	WEEKLY FOR 2 MONTHS ,EVERY 4TH DAY FOR 4 MONTHS	Incremental	increase	1/w to 2/w	Yes	volume overload	1	VOLUME OVERLOAD	N		39	16
19	RJ	WEEKLY FOR 6 MONTHS	Incremental	static	1/w	No		0		N		27	16
20	NBS	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		0		N		51	16
21	DS	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		2	VOLUME OVERLOAD, VOLUME OVERLOAD	N		53	15
22	NJ	TWICE WEEKLY FOR 4 MONTHS ,THRICE WEEKY FOR 2 MONTHS	Incremental	increase	2/w to 3/w	Yes	uremic symptoms	1	VOLUME OVERLOAD	N		61	17
23	PS	TWICE WEEKLY FOR 4 MONTH, THRICE WEEKLY FOR 1 MONTH	Incremental	increase	2/w to 3/w	Yes	volume overload	3	VOLUME OVERLOAD,CVA,EXTRAPULMONARY KOCHS	Y	EXPIRED AFTER 4 MONTHS DUE TO EXTRAPULMONARY KOCHS	45	15
24	BD										LOST FOLLOW UP		16
25	VS										LOST FOLLOW UP		18
26	MS	WEEKLY FOR 1.5 MONTH, TWICE WEEKLY FOR 3 MONTHS ,MTHRICE WEEKLY FOR 1.5 MONTHS	Incremental	increase	1/w to 2/w	Yes	volume overload	2	VOLUME OEVRLOAD ,PERICARDIAL EFFUSION	N		48	19
27	ABAS	WEEKLY FOR 1 MONTH, TWICE WEEKLY FOR 5 MONTHS	Incremental	increase	1/w to 2/w	Yes	uremic symptoms	0		N		44	16
28	DM	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		0		N		51	17
29	VS	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		0		N		53	18
30	RANI	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		1	DKA	N		52	18
31	DS	WEEKLY FOR 2 MONTH, TWICE WEEKLY FOR 4 MONTHS	Incremental	increase	1/w to 2/w	Yes	uremic symptoms	2	VOLUME OVERLOAD, UREMIC SYMPTOMS	N		41	18
32	GS	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		0		N		52	16
33	BS	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		1	CRBSI	N		53	17
34	HK	WEEKLY FOR 6 MONTHS	Incremental	static	1/w	No		0		N		27	17
35	SS										LOST FOLLOW UP		17
36	JS	EVERY 5TH DAY- 3 MONTHS, TWICE WEEKLY- 3 MONTHS	Incremental	increase	1.4w to 2/w	Yes	uremic symptoms	0		N		33	20

SR. NO	PATIENT'S NAME	baseline_domain 1transformed score (4-20)	baseline_domain 1 transformed score (0-100)	baseline_domain 2 raw score	baseline_domain 2 transformed score (4-20)	baseline_domain 2 transformed score(0-100)	baseline_domain 3 raw score	baseline_domain 3 transformed score (4-20)	baseline_domain 3 transformed score (0-100)	baseline_domain 4 raw score	baseline_domain 4 transformed score (4-20)	baseline_domain 4 transformed score (0-100)	At 6month_domain 1 raw score	At 6month_domain 1transformed score (4-20)
1	JPS	13	56	16	11	44	13	17	81	28	14	63	22	13
2	SK	10	38	18	12	50	10	13	56	16	8	25	20	11
3	BC	10	38	16	11	44	10	13	56	23	12	50	19	11
4	BRS	11	44	19	13	56	8	11	44	26	13	56	21	12
5	PK	9	31	15	10	38	8	11	44	23	12	50	21	12
6	KS	10	38	16	11	44	9	12	50	17	9	31	22	13
7	AS	5	6	9	6	13	5	7	19	14	7	19		
8	DM	10	38	17	11	44	9	12	50	21	11	44	22	13
9	MKJ	7	19	10	6	13	6	8	25	13	7	19	16	9
10	S	10	38	16	11	44	8	11	44	17	9	31	16	9
11	PC	10	38	18	12	50	7	9	31	20	10	38	19	11
12	PK	9	31	16	11	44	8	11	44	20	10	38	15	9
13	RK	10	38	17	11	44	6	8	25	21	11	44	20	11
14	JS	9	31	14	9	31	8	11	44	22	11	44	14	8
15	SJ	10	38	16	11	44	8	11	44	16	8	25	16	9
16	GRS	11	44	16	11	44	9	12	50	20	10	38	23	13
17	TR	10	38	19	13	56	8	11	44	20	10	38	22	13
18	RR	9	31	16	11	44	7	9	31	18	9	31	10	6
19	RJ	9	31	18	12	50	7	9	31	20	10	38	21	12
20	NBS	9	31	17	11	44	8	11	44	17	9	31	14	8
21	DS	9	31	16	11	44	8	11	44	18	9	31	13	7
22	NJ	10	38	18	12	50	9	12	50	18	9	31	17	10
23	PS	9	31	13	9	31	6	8	25	16	8	25		
24	BD	9	31	18	12	50	6	8	25	20	10	38		
25	VS	10	38	16	11	44	8	11	44	19	10	38		
26	MS	11	44	18	12	50	8	11	44	20	10	38	20	11
27	ABAS	9	31	18	12	50	7	9	31	18	9	31	21	12
28	DM	10	38	19	13	56	7	9	31	18	9	31	23	13
29	VS	10	38	18	12	50	8	11	44	19	10	38	22	13
30	RANI	10	38	16	11	44	8	11	44	18	9	31	15	9
31	DS	10	38	17	11	44	8	11	44	19	10	38	15	9
32	GS	9	31	19	13	56	8	11	44	20	10	38	18	10
33	BS	10	38	18	12	50	9	12	50	19	10	38	14	8
34	HK	10	38	16	11	44	9	12	50	20	10	38	20	11
35	SS	10	38	19	13	56	8	11	44	21	11	44		
36	JS	11	44	18	12	50	9	12	50	20	10	38	15	9

SR. NO	PATIENT'S NAME	At 6month_domain 1 transformed score (0-100)	At 6month_domain 2 raw score	At 6month_domain 2 transformed score (4-20)	At 6month_domain 2 transformed score(0-100)	At 6month_domain 3 raw score	At 6month_domain 3 transformed score (4-20)	At 6month_domain 3 transformed score (0-100)	At 6month_domain 4 raw score	At 6month_domain 4 transformed score (4-20)	At 6month_domain 4 transformed score (0-100)
1	JPS	56	18	12	50	12	16	75	24	12	50
2	SK	44	18	12	50	11	15	69	30	15	69
3	BC	44	19	13	56	11	15	69	27	14	63
4	BRS	50	18	12	50	11	15	69	28	14	63
5	PK	50	19	13	56	12	16	75	27	14	63
6	KS	56	21	14	63	10	13	56	23	12	50
7	AS										
8	DM	56	18	12	50	10	13	56	27	14	63
9	MKJ	31	15	10	38	6	8	25	18	9	31
10	S	31	15	10	38	6	8	25	17	9	31
11	PC	44	21	14	63	9	12	50	26	13	56
12	PK	31	13	9	31	6	8	25	16	8	25
13	RK	44	18	12	50	8	11	44	22	11	44
14	JS	25	13	9	31	7	9	31	23	12	50
15	SJ	31	14	9	31	7	9	31	13	7	19
16	GRS	56	19	13	56	10	13	56	27	14	63
17	TR	56	22	15	69	11	15	69	31	16	75
18	RR	13	13	9	31	8	11	44	14	7	19
19	RJ	50	22	15	69	11	15	69	24	12	50
20	NBS	25	15	10	38	6	8	25	14	7	19
21	DS	19	13	9	31	6	8	25	15	8	25
22	NJ	38	16	11	44	7	9	31	19	10	38
23	PS										
24	BD										
25	VS										
26	MS	44	21	14	63	11	15	69	26	13	56
27	ABAS	50	23	15	69	10	13	56	25	13	56
28	DM	56	22	15	69	10	13	56	27	14	63
29	VS	56	23	15	69	10	13	56	29	15	69
30	RANI	31	14	9	31	6	8	25	15	8	25
31	DS	31	13	9	31	7	9	31	18	9	31
32	GS	38	20	13	56	10	13	56	26	13	56
33	BS	25	16	11	44	6	8	25	18	9	31
34	HK	44	21	14	63	11	15	69	28	14	63
35	SS										
36	JS	31	16	11	44	7	9	31	18	9	31

SR. NO	PATIENT'S NAME	AGE	SEX	MRD NO.	DATE OF INITIATION OF HEMODIALYSIS	HEIGHT (CM)	WEIGHT (KG)	BMI (kg/m2)	BASIC DISEASE LEADING TO ESRD	disease with duration (YRS)	PAST HISTORY Diabetes	Hypertension	Autoimmune disease	other comorbities	FAMILY HISTORY: +/-	SMOKING	Alcohol	Any other drug abuse	SPO2(%)	Temperature (F)	JVP
37	AS	32	M	1293439	26-04-2022	174	61.5	20.31	HTN	5	N	Y	N	N	NEG	N	Y	N	98	99	N
38	RB	29	F	1233445	05-01-2022	156	45	18.49	CGN	2	N	Y	Y	N	NEG	N	N	N	94	99.2	N
39	BK	51	F	907159	06-05-2022	152	62	26.84	DM2	12	Y	Y	N	N	NEG	N	N	N	97	98	N
40	JS	47	M	1292958	24-04-2022	182	88	26.57	HTN	1	N	Y	N	N	NEG	N	Y	N	96	99	N
42	BS	30	M	1200794	16-01-2022	170	55	19.03	CGN	1	N	Y	Y	N	NEG	N	Y	N	96	97.8	N
43	SS	55	M	1155527	16-08-2021	178	95	29.98	DM2	16	Y	Y	N	N	NEG	N	N	N	97	98.6	N
44	KS	59	M	332646	22-11-2021	175	85	27.76	DM2	12	Y	Y	N	N	NEG	N	Y	N	95	98.8	N
45	BP	50	M	1301428	10-05-2022	155	55	22.89	HTN	10	N	Y	N	N	FATHER-HYPERTENSIVE	N	N	N	99	98.4	N
46	MS	57	M	1251131	26-02-2022	175	68	22.20	HTN	6	N	Y	N	N	NEG	N	N	N	96	99	N
47	SS	47	F	1259532	25-02-2022	165	64.8	23.80	DM2	10	N	Y	N	N	MOTHER-HYPERTENSIVE	N	N	N	97	98.2	N
48	MK	64	F	1237196	11-01-2022	157	47	19.07	HTN	25	N	Y	N	N	NEG	N	N	N	98	98	N
49	SK	55	M	522484	09-12-2021	167	52.5	18.82	HTN	20	N	Y	N	CVA	NEG	N	N	N	96	98.6	N
50	SK	61	F	1119430	05-05-2022	170	75	25.95	DM2	20	Y	Y	N	N	NEG	N	N	N	95	99	N
51	AS	59	M	1269406	01-07-2022	162	75	28.58	HTN	18	N	Y	N	N	NEG	N	Y	N	96	98.6	N
52	RK	50	F	1129764	09-06-2022	165	65	23.88	DM2	15	Y	Y	N	N	NEG	N	N	N	86	99.8	Y
53	JYOTI	42	F	1009268	20-10-2021	165	69	25.34	DM2	8	Y	Y	N	N	NEG	N	N	N	88	98	N
54	R	23	F	1275702	24-03-2022	160	44	17.19	RENAL CORTICAL NECROSIS	0.083333333	N	Y	N	N	NEG	N	N	N	96	98.6	N
55	RK	62	M	1265484	08-03-2022	176	62.5	20.18	DM2	15	Y	Y	N	N	NEG	N	Y	N	92	99	N
56	DS	64	M	970091	25-06-2022	166	53.6	19.45	HTN	25	N	Y	N	N	NEG	N	Y	N	97	97.8	N
57	ASW	63	M	898436	10-05-2022	177	70	22.34	DM2	22	Y	Y	N	N	NEG	N	N	N	94	98	N
58	GS	40	M	1357513	11-08-2022	167	69	24.74	HTN	12	N	Y	N	N	NEG	N	Y	N	98	99.2	N
59	BK	59	M	40503	01-10-2021	170	62	21.45	DM2	16	N	Y	N	N	NEG	N	N	N	96	98.4	N
60	RS	62	M	709788	19-02-2022	172	53.1	17.95	CHRONIC ANALGESIC ABUSE	10	N	Y	N	N	NEG	N	N	N	95	99.2	N
61	PS	57	M	1344677	21-07-2022	170	70	24.22	DM2	15	Y	Y	N	N	NEG	N	N	N	97	98.8	N
62	BS	38	M	1312037	08-07-2022	178	80	25.25	CGN	2	N	Y	Y	N	NEG	N	N	N	97	99	N
63	GS	49	M	709394	26-03-2022	170	75	25.95	HTN	15	N	Y	N	N	NEG	N	N	N	96	98	N
64	RS	26	M	1365380	24-06-2022	170	72	24.91	CGN	3	N	Y	Y	N	NEG	N	N	N	97	99.2	N
65	JP	60	M	1345081	28-05-2022	168	46.6	16.51	HTN	22	N	Y	N	N	NEG	N	N	N	96	98.8	N
66	AK	58	F	1434456	13-09-2021	150	39	17.33	DM2	16	Y	Y	N	N	NEG	N	N	N	92	99	Y
67	PK	56	M	1307887	20-05-2022	165	71	26.08	HTN	15	N	Y	N	N	NEG	N	N	N	96	98	N
68	RK	53	F	1370185	01-08-2022	160	45	17.58	HTN	17	N	Y	N	N	NEG	N	N	N	95	99	N
69	VK	54	M	1002860	19-07-2022	175	103	33.63	DM2	14	Y	Y	N	N	NEG	N	N	N	96	98.2	N
70	SP	47	F	973292	29-07-2022	165	60	22.04	HTN	8	N	Y	N	N	NEG	N	N	N	97	99	N
71	AC	58	M	266575	04-04-2022	155	36	14.98	HTN	18	N	Y	N	N	NEG	N	Y	N	96	99	N
72	AS	59	M	1115055	01-08-2021	170	54	18.69	DM2	15	Y	Y	N	N	NEG	N	N	N	96	98.4	N

SR. NO	PATIENT'S NAME	Pallor	Icterus	Clubbing	Cyanosis	Edema	Lymphadenopathy	Pulse (per minute)	SBP (mmhg)	DBP(mmhg)	Respiratory system	Cardiovascular system	Central nervous system	Abdomen
37	AS	Y	N	N	N	N	N	86	156	100	within normal limit	within normal limit	within normal limit	within normal limit
38	RB	Y	N	N	N	N	N	80	146	90	within normal limit	within normal limit	within normal limit	within normal limit
39	BK	Y	N	N	N	Y	N	88	156	90	within normal limit	within normal limit	within normal limit	within normal limit
40	JS	Y	N	N	N	Y	N	80	190	100	within normal limit	within normal limit	within normal limit	within normal limit
42	BS	Y	N	N	N	N	N	74	150	90	within normal limit	within normal limit	within normal limit	within normal limit
43	SS	Y	N	N	N	Y	N	76	156	84	within normal limit	within normal limit	within normal limit	within normal limit
44	KS	Y	N	N	N	N	N	86	160	100	within normal limit	within normal limit	within normal limit	within normal limit
45	BP	N	N	N	N	N	N	84	156	90	within normal limit	within normal limit	within normal limit	within normal limit
46	MS	Y	N	N	N	Y	N	88	160	90	within normal limit	within normal limit	within normal limit	within normal limit
47	SS	Y	N	N	N	Y	N	84	130	80	within normal limit	within normal limit	within normal limit	within normal limit
48	MK	Y	N	N	N	Y	N	78	160	90	within normal limit	within normal limit	within normal limit	within normal limit
49	SK	Y	N	N	N	Y	N	92	168	94	within normal limit	within normal limit	Left side weakness	within normal limit
50	SK	Y	N	N	N	Y	N	80	170	100	within normal limit	within normal limit	within normal limit	within normal limit
51	AS	Y	N	N	N	Y	N	78	160	96	within normal limit	within normal limit	within normal limit	within normal limit
52	RK	Y	N	N	N	Y	Y(CERVICAL)	100	144	100	B/L CREPTS	SYSTOLIC MURMUR PRESENT	within normal limit	DISTENDED, SHIFTING DULLNESS PRESENT
53	JYOTI	Y	N	N	N	Y	N	80	160	96	within normal limit	within normal limit	within normal limit	within normal limit
54	R	Y	N	N	N	Y	N	84	146	90	within normal limit	within normal limit	within normal limit	within normal limit
55	RK	Y	N	N	N	Y	N	80	160	90	B/L CREPTS	within normal limit	within normal limit	within normal limit
56	DS	Y	N	N	N	Y	N	88	170	96	within normal limit	within normal limit	within normal limit	within normal limit
57	ASW	Y	N	N	N	Y	N	80	120	80	within normal limit	within normal limit	within normal limit	within normal limit
58	GS	N	N	N	N	N	N	82	140	86	within normal limit	within normal limit	within normal limit	within normal limit
59	BK	Y	N	N	N	Y	N	84	150	76	within normal limit	within normal limit	within normal limit	within normal limit
60	RS	Y	N	N	N	N	N	88	160	90	within normal limit	within normal limit	within normal limit	within normal limit
61	PS	Y	N	N	N	Y	N	84	156	90	within normal limit	within normal limit	within normal limit	within normal limit
62	BS	Y	N	N	N	Y	N	86	140	84	within normal limit	within normal limit	within normal limit	within normal limit
63	GS	Y	N	N	N	Y	N	84	150	90	within normal limit	within normal limit	within normal limit	within normal limit
64	RS	Y	N	N	N	Y	N	80	144	86	within normal limit	within normal limit	within normal limit	within normal limit
65	JP	N	N	N	N	Y	N	82	160	92	within normal limit	within normal limit	within normal limit	within normal limit
66	AK	Y	N	N	N	Y	N	96	180	100	B/L CREPTS	SYSTOLIC MURMUR PRESENT	within normal limit	DISTENDED, SHIFTING DULLNESS PRESENT
67	PK	Y	N	N	N	Y	N	96	140	86	within normal limit	within normal limit	within normal limit	within normal limit
68	RK	Y	N	N	N	Y	N	84	150	94	within normal limit	within normal limit	within normal limit	within normal limit
69	VK	Y	N	N	N	Y	N	78	130	100	within normal limit	within normal limit	within normal limit	DISTENDED
70	SP	N	N	N	N	N	N	90	140	88	within normal limit	within normal limit	within normal limit	within normal limit
71	AC	Y	N	N	N	Y	N	68	170	100	B/L CREPTS	within normal limit	within normal limit	within normal limit
72	AS	Y	N	N	N	Y	N	78	140	90	B/L CREPTS	within normal limit	within normal limit	within normal limit

SR. NO	PATIENT'S NAME	Eye	ENT	Hep B	Hep C	HIV	Other co-morbidities	Baseline_urea clearance (ml/min)	at 3 months_urea clearance(ml/min)	6 month_urea clearance(ml/min)	Baseline_creatinine clearance (ml/min)	at 3 months_creatinine clearance (ml/min)	6 month_creatinine clearance (ml/min)	Baseline_Urine volume (ml in 12 hrs)	at 3 months_Urine volume (ml in 12 hrs)	6 month_Urine volume (ml in 12 hrs)
37	AS	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	1.58	0	0	1.32	0	0	300	0	0
38	RB	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	CLD(NASH), HYPOTHYROIDISM	0.32	0	0	0.18	0	0	100	0	0
39	BK	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	CLD(NASH)	0.83	0.52		0.62	0.48		200	150	
40	JS	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	1.34	0.63	0.51	1.02	0.44	0.48	200	100	100
42	BS	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	0.57	0.26	0.32	0.38	0.31	0.28	100	50	50
43	SS	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	0.94	0	0	0.72	0	0	200	0	0
44	KS	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	2.24	1.1	1.23	2.01	1.03	1.34	600	300	300
45	BP	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	1.92	1.32	0.43	1.62	1.1	0.3	400	300	150
46	MS	within normal limit	within normal limit	NR	NR	NR	NO	2.12	1.43	1.1	3.51	1.3	1.03	500	400	300
47	SS	within normal limit	within normal limit	NR	NR	NR	NO	2.14	1.62	1.76	1.82	1.48	1.58	500	400	400
48	MK	IOL	within normal limit	NR	NR	NR	NO	2.24	1.1	1.23	2.01	1.03	1.34	400	300	300
49	SK	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	0.18			0.24			200		
50	SK	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	1.32	1.1	1.12	1.16	1.12	1.2	400	300	300
51	AS	within normal limit	within normal limit	NR	NR	NR	OBESE, BPH	0.92			0.68			250		
52	RK	B/L PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	CAD	0.17	0	0	0.09	0	0	50	0	0
53	JYOTI	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	3	2.54	2.68	2.8	2.6	2.54	500	400	400
54	R	within normal limit	within normal limit	NR	NR	NR	NO	0	0	0	0	0	0	0	0	0
55	RK	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	1.4	0	0	1.3	0	0	150	0	0
56	DS	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	2.64	1.38	1.52	2.41	1.26	1.38	400	200	200
57	ASW	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	1.32	0.63	0.82	1.18	0.41	0.52	200	50	50
58	GS	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	1.4	0.62	0.23	1.32	0.5	0.2	300	100	50
59	BK	within normal limit	within normal limit	NR	NR	NR	NO	0.61	0	0	0.48	0	0	100	0	0
60	RS	IOL	within normal limit	NR	NR	NR	NO	3.2	2.8	3.1	2.8	2.54	2.7	500	400	400
61	PS	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	1.56	0.48	0.18	1.38	0.31	0.15	300	100	50
62	BS	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	3.32	2.93	3.02	2.78	2.58	2.64	500	400	400
63	GS	within normal limit	within normal limit	NR	NR	NR	NO	2.8	0.63	0.24	2.54	0.52	0.31	400	100	50
64	RS	within normal limit	within normal limit	NR	NR	NR	NO	1.43	1.1	0.72	1.3	1.03	0.52	400	300	200
65	JP	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	1.4	0.74	0.28	1.28	0.56	0.32	400	200	100
66	AK	B/L PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	0.97	0.46	0.23	0.74	0.32	0.2	200	100	50
67	PK	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	0.44	0	0	0.3	0	0	100	0	0
68	RK	B/L HYPERTENSIVE RETINOPATHY	within normal limit	NR	NR	NR	NO	1.55	0.279	0.29	1.77	0.3	0.27	300	50	50
69	VK	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	0.93	0.26	0.29	0.81	0.31	0.27	200	50	50
70	SP	within normal limit	within normal limit	NR	NR	NR	NO	0.71	0.36	0.11	1.1	0.72	0.29	300	200	100
71	AC	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	3.45	1.73	1.81	3.12	1.6	1.72	600	400	400
72	AS	B/L-NON PROLIFERATIVE DIABETIC RETINOPATHY	within normal limit	NR	NR	NR	NO	0.93	0.26	0.29	0.81	0.3	0.27	200	50	50

SR. NO	PATIENT'S NAME	Baseline_Residual renal function (ml/min)_	at 3 months_Residual renal function (ml/min)_	6 month_Residual renal function (ml/min)_	vascular access for hemodialysis	baseline 2D echocardiography	at 6 month_2D echocardiography	baseline (normal/abnormal)2D echocardiography	at 6 month (worsened/improved)2D echocardiography
37	AS	1.45	0	0	AV Fistula	GHK WITH EF 42%	GHK WITH EF 30%	abnormal	worsened
38	RB	0.25	0	0	AV Fistula	GHK WITH EF-38%	GHK WITH EF-26%	abnormal	worsened
39	BK	0.71	0.5		TEMPORARY JUGULAR DIALYSIS CATHETER	GHK WITH EF 25%		abnormal	
40	JS	1.18	0.53	0.49	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	GHK EF-48%	normal	worsened
42	BS	0.47	0.29	0.25	tunneled ijv dialysis catheter	GHK WITH EF -12%	GHK WITH EF- 20-22%	abnormal	improved
43	SS	0.83	0	0	AV Fistula	GHK WITH EF-38%	GHK WITH EF- 20%	abnormal	worsened
44	KS	2.12	1.06	1.28	AV Fistula	GHK WITH EF-44%	GHK WITH EF -44%	abnormal	same
45	BP	1.72	1.21	0.36	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
46	MS	2.81	1.36	1.06	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
47	SS	1.98	1.55	1.72	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
48	MK	2.12	1.06	1.28	AV Fistula	GHK WITH EF 40%	GHK WITH EF 52%	abnormal	improved
49	SK	0.21			tunneled ijv dialysis catheter	GHK WITH EF 32%		abnormal	
50	SK	1.24	1.11	1.18	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
51	AS	0.8			TEMPORARY JUGULAR DIALYSIS CATHETER	RWMA WITH EF 18%		abnormal	
52	RK	0.13	0	0	AV Fistula	GHK WITH EF 14%	GHK WITH EF 12-14%	abnormal	same
53	JYOTI	2.9	2.57	2.62	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
54	R	0	0	0	AV Fistula	GHK WITH EF 45%	GHK WITH EF 45%	abnormal	same
55	RK	1.35	0	0	AV Fistula	GHK WITH EF 38%	GHK WITH EF 30%	abnormal	worsened
56	DS	2.51	1.32	1.45	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
57	ASW	1.25	0.52	0.62	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
58	GS	1.36	0.56	0.21	AV Fistula	GHK WITH EF 48%	GHK WITH EF 32%	abnormal	worsened
59	BK	0.54	0	0	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	GHK WITH EF 42%	normal	worsened
60	RS	3	2.67	2.9	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
61	PS	1.47	0.4	0.16	AV Fistula	GHK WITH EF 38%	GHK WITH EF 24%	abnormal	worsened
62	BS	3.05	2.75	2.83	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
63	GS	2.67	0.57	0.28	AV Fistula	GHK WITK EF52%	GHK WITH EF 38%	abnormal	worsened
64	RS	1.36	1.06	0.62	AV Fistula	GHK WITH EF 46%	GHK WITH EF 40%	abnormal	worsened
65	JP	1.34	0.65	0.3	tunneled ijv dialysis catheter	GHK WITH EF 28%	GHK WITH EF 22%	abnormal	worsened
66	AK	0.85	0.39	0.21	AV Fistula	GHK WITH EF 28%	GHK WITH EF 22%	abnormal	worsened
67	PK	0.37	0	0	AV Fistula	GHK WITH EF 42%	GHK WITH EF 30%	abnormal	worsened
68	RK	1.66	0.29	0.28	AV Fistula	RWMA WITH EF36%	RWMA WITH EF 30%	abnormal	worsened
69	VK	0.87	0.29	0.28	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
70	SP	0.9	0.5	0.2	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
71	AC	3.28	1.66	1.71	AV Fistula	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	NORMAL LV SIZE AND SYSTOLIC FUNCTION EF -60%	normal	same
72	AS	0.87	0.29	0.28	AV Fistula	GHK WITH EF 32%	GHK WITH EF 22%	abnormal	worsened

SR. NO	PATIENT'S NAME	EF BASELINE	EF 6 MONTH	Hb_at initiation (gm/dl)	Hb_at 1 month (gm/dl)	Hb_at 2 month (gm/dl)	Hb_at 3 month (gm/dl)	Hb_at 4 month (gm/dl)	Hb_at 5 month (gm/dl)	Hb_at 6 month (gm/dl)	Serum Calcium_at initiation (mg/dl)	Serum Calcium_at 1 month (mg/dl)	Serum Calcium_at 2 month (mg/dl)	Serum Calcium_at 3 month (mg/dl)	Serum Calcium_at 4 month (mg/dl)	Serum Calcium_at 5 month (mg/dl)	Serum Calcium_at 6 month (mg/dl)
37	AS	42	30	6.6	9	8.2	7.6	6.9	7.2	7.4	7.4	7.7	7.2	7.1	7	6.9	6.7
38	RB	38	26	8.4	8.1	7.9	8	7.7	7	7.2	7.1	8	8.1	8	7.7	7.6	7
39	BK	25		11	10.9	11	10.8				7.4	7.8	7.6	8			
40	JS	60	48	7.4	7.6	7.2	6.9	7.4	7.3	7.1	7.7	7.6	7.6	7.7	7.8	7.4	8.1
42	BS	12	22	7.7	7.6	7.7	8.1	7.4	7.6	7.2	5.5	6.3	7	6.6	6.8	7	7.1
43	SS	38	20	8.1	8.3	9.7	10.3	9.4	8.8	9.1	5.7	5.6	6.8	6.6	7.1	6.9	7
44	KS	44	44	9.1	9.2	8.8	8.9	9.4	9	9.2	8.3	8	8	8.2	7.7	7.6	8
45	BP	60	60	11	10.5	10.8	10.1	9.8	10.2	9.9	8.8	8.6	8.1	7.9	8.4	8.2	8.1
46	MS	60	60	7.3	7.1	7.4	7	6.9	7.4	7.2	7.6	7.1	7.3	7.6	7.8	7.6	7.5
47	SS	60	60	9.8	10.1	10	9.9	9.6	9.8	10.1	8.2	8.1	8	7.8	8.2	8	7.9
48	MK	40	52	9.4	11	10.4	10.8	10	9.8	10.4	7.4	8.1	8.2	7.8	7.7	8.1	8.3
49	SK	32		8.2	7.8	7.1	6.9				5.7	6.8	6.3	7.1			
50	SK	60	60	10	9.8	9.6	9.8	10	9.9	9.6	7.9	8.2	8.3	8.6	8.8	8.4	8.5
51	AS	18		7	7.1						6.8	6.5					
52	RK	14	60	10	9.6	9.8	8.4	8.1	8.6	7.8	8.2	8	7.6	7.1	7.2	7.1	7.2
53	JYOTI	60	45	9.8	9.6	8.8	9.4	9	9.8	9.6	8.3	8.4	7.8	8.1	8.8	8.4	8.4
54	R	45	30	6.8	7.1	7	6.7	7.2	6.8	7	10	9.2	9.3	8.8	9	9.1	8.8
55	RK	38	60	7.3	12.8	10.3	8.1	6.8	7.8	8	7.1	6.8	7.2	7	7.6	7.2	7.4
56	DS	60	60	10.1	11.8	10.8	11.2	11	10.6	11	8.8	8.6	8.6	8.9	8.8	8.4	8.6
57	ASW	60	32	12.8	11.7	10.8	11	10.6	10	10.2	8.5	8.4	8.1	8.6	8.4	7.8	8.1
58	GS	48	42	9.1	8.8	8.6	8.6	8.4	8.1	8.2	7.6	7.5	7.6	7.2	6.8	7.5	7
59	BK	60	60	8.7	9	8.8	9.4	9.2	8.6	7.6	7.2	7.6	7.1	6.8	7.4	7	6.9
60	RS	60	24	11.2	10.8	10.6	10.8	10.4	10.8	10.2	8.6	8.5	7.8	8	7.7	7.8	8
61	PS	38	60	10.8	10.4	9.8	10	9.1	8.6	8	6.6	6.8	7.1	7	6.8	6.4	6.6
62	BS	60	24	9.8	10	10.6	9.8	10.2	10.4	9.8	8.4	8.2	7.7	7.8	7.5	8	8.1
63	GS	52	60	7.4	8.1	9.6	9	8.7	8	8.6	8.5	8.1	8.3	8	7.6	8.1	7.9
64	RS	46	38	11.1	8.8	9.4	9	8.6	8.8	8.7	8.9	8.4	8.5	8.6	8.2	7.9	8.1
65	JP	28	40	11.2	10.8	10	9.6	10	10.2	9.8	8.6	8.4	7.8	7.7	7.8	8.2	7.6
66	AK	28	22	9.9	8	9.1	10.7	9.6	9.6	9.8	9.1	9.1	9.4	10	9	9.2	9.2
67	PK	42	22	9	8.2	8.2	7.8	7.5	7.4	7.8	7.2	8	7.6	7.4	7.1	7	7.4
68	RK	36	30	7.2	6.8	7	6.8	7.2	7	7.2	9.3	8.4	8.2	8.6	8.8	9.1	9
69	VK	60	30	9.2	8.8	9	9.4	8.7	8.8	9.2	8.7	8.8	8.4	8	8.2	7.8	8.1
70	SP	60	60	10.9	11.4	12	11.8	11.2	10.1	10.8	8.1	8.1	7.9	8	7.8	8.2	8.1
71	AC	60	60	10.4	10.2	9.8	10	9.6	9	9.4	8.2	8	8.1	7.8	7.7	8	8.2
72	AS	32	22	8.8	8	7.8	7.6	7.8	8	8.2	7.2	7.1	7.2	7.4	7.1	6.8	7

SR. NO	PATIENT'S NAME	serum phosphorus_at initiation (mg/dl)	serum phosphorus_at 1 month (mg/dl)	serum phosphorus_at 2 month (mg/dl)	serum phosphorus_at 3 month (mg/dl)	serum phosphorus_at 4 month (mg/dl)	serum phosphorus_at 5 month (mg/dl)	serum phosphorus_at 6 month (mg/dl)	serum PTH_at initiation (pg/ml)	serum PTH_at 3 month(pg/ml)	serum PTH_at 6 month(pg/ml)	serum vit D3_at initiation (ng/ml)	serum vit D3_at 3 month(ng/ml)	serum vit D3_at 6 month(ng/ml)	serum ferritin_at initiation(ng/ml)	serum ferritin_at 3 month(ng/ml)	serum ferritin_at 6 month(ng/ml)
37	AS	5.4	5.6	5.9	5	5.6	5.4	4.8	453	502	600	18	28	32	853	544	633
38	RB	5.3	6	5.7	4.9	6.1	5.8	5.6	544	358	457	19	28	27	541	603	652
39	BK	4.9	5.8	5.4	6.5				424	367		29	34		145	220	
40	JS	5.45	6	6.2	5.3	4.8	4.7	5.2	454	353	502	18	24	32	545	604	803
42	BS	7.5	6.3	5.4	5.8	5.2	4.9	5.4	653	540	504	32	24	18	506	434	633
43	SS	8	6	5.8	5.4	6	6.2	6.4	656	546	488	12	30	22	653	444	588
44	KS	5.4	5.6	5.5	5.4	5.2	5	4.8	454	378	414	38	36	28	442	322	368
45	BP	4.5	5.6	5.5	6	6.1	5.8	5.4	232	403	358	38	24	18	132	304	352
46	MS	5.6	6.5	5.4	6.2	6	5.8	5.5	353	452	388	32	28	24	653	588	604
47	SS	5.6	5.4	4.9	5.6	5.6	5.8	6	253	304	404	48	42	28	158	202	260
48	MK	5.5	5	4.8	5.6	6	5.8	5.3	234	338	288	44	30	24	400	253	208
49	SK	5.8	6	6.2	6.2				555	484		18	30		858	766	
50	SK	5.2	5.6	5.4	4.8	5.2	5.4	5	253	350	312	42	34	28	123	334	263
51	AS	6	6.4						564			22			854		
52	RK	8	7.6	6.5	6.4	6.6	6.8	6.1	454	560	662	31	16	28	253	656	788
53	JYOTI	5.4	6	5.2	6.1	5.7	6.1	5.7	153	204	216	43	40	32	353	404	382
54	R	4.5	3.8	4.6	5.2	5	4.6	5.3	138	210	230	38	34	30	546	348	410
55	RK	3.58	4.2	4.4	4	4.6	4.5	4.3	454	488	532	28	18	14	650	752	690
56	DS	4.7	4.8	5.4	4.2	4.6	4.5	5.1	132	192	160	44	38	36	154	160	194
57	ASW	6.72	5.6	5.5	5.6	6	6.2	6.6	154	188	210	38	30	24	132	160	198
58	GS	5.6	5.4	4.9	6	5.8	5	5.4	344	480	520	24	16	18	454	568	565
59	BK	4.54	5.6	5.8	4.1	3.58	3.4	3.6	368	402	506	18	28	34	553	656	592
60	RS	5.6	5.4	6	5.8	5.6	5.4	5.8	188	210	245	48	52	40	184	144	214
61	PS	6.8	7	6.2	5.8	4.8	5.6	6.1	440	545	632	14	12	20	314	330	348
62	BS	5.9	6.8	6.2	6	5.8	5.9	5.4	235	254	308	65	54	46	234	303	308
63	GS	6.52	5.6	4.9	5.4	5.7	5.3	4.8	248	302	414	48	32	28	454	504	480
64	RS	5.35	5.4	5.6	6	5.4	4.5	5.8	314	343	386	52	46	32	1266	888	814
65	JP	5.64	5.4	4.8	5.4	5.6	5.6	4.8	419	454	345	48	46	44	388	400	414
66	AK	4.3	4.2	4.3	4.13	6.4	4	3.6	120	221	188	23	22	25	22	44	132
67	PK	5.6	5.4	4.8	5.3	5.6	5.4	5.1	454	560	605	34	24	20	344	402	560
68	RK	4.15	4.5	4.7	5.4	4.8	5	5.2	153	210	258	60	48	32	1209	813	765
69	VK	6	5.8	6.2	4.8	5.4	7.3	6.8	353	400	456	21	28	16	300	258	314
70	SP	4.5	5.6	5.4	3.8	5.6	5.8	4	344	414	425	24	30	34	253	300	285
71	AC	5.4	4.5	4.8	5.6	5	4.8	5.3	248	302	344	30	34	38	564	378	416
72	AS	6.1	5.8	5.1	5	4.5	4.8	5	420	544	532	24	30	28	545	436	512

SR. NO	PATIENT'S NAME	serum iron_at initiation (mcg/dl)	serum iron_at 3 month(mcg/ml)	serum iron_at 6 month(mcg/dl)	TIBC_at initiation (mcg/dl)	TIBC_at 3 month(mcg/dl)	TIBC_at 6 month(mcg/dl)	serum total bilirubin at initiation (mgm/dl)	serum bilirubin (D) at initiation(mgm/dl)	serum bilirubin (I) at initiation(mgm/dl)	serum bilirubin (T)at 3 month (mgm/dl)	serum bilirubin (D) at 3 month(mgm/dl)	serum bilirubin (I) at 3 month(mgm/dl)	serum bilirubin(T) at 6 month(mgm/dl)	serum bilirubin (D) at 6 month(mgm/dl)	serum bilirubin (I) at 6month(mgm/dl)
37	AS	12	24	30	275	180	176	0.05	0.01	0.04	0.3	0.1	0.2	0.24	0.13	0.11
38	RB	30.8	26	24	180	200	196	0.3	0.2	0.1	0.4	0.21	0.19	0.51	0.27	0.24
39	BK	60	45		98	130		1	0.64	0.36	1.2	0.35	0.85			
40	JS	38	32	18	180	240	306	0.21	0.11	0.1	0.3	0.1	0.2	0.72	0.31	0.41
42	BS	18	23	28	220	198	180	0.32	0.12	0.2	0.4	0.2	0.2	0.31	0.21	0.1
43	SS	24	50	38	204	138	166	0.41	0.21	0.2	0.36	0.16	0.2	0.46	0.2	0.26
44	KS	68	54	48	348	456	520	0.2	0.12	0.08	0.32	0.12	0.2	0.42	0.22	0.2
45	BP	56	45	38	140	162	192	0.3	0.1	0.2	0.41	0.31	0.1	0.45	0.37	0.08
46	MS	98.3	72	64	241	260	238	0.3	0.24	0.06	0.32	0.16	0.16	0.3	0.2	0.1
47	SS	52	46	46	132	174	156	0.32	0.14	0.18	0.42	0.19	0.23	0.31	0.21	0.1
48	MK	65	48	52	130	190	168	0.32	0.1	0.22	0.4	0.2	0.2	0.21	0.1	0.11
49	SK	20	16		230	190		0.3	0.1	0.2	0.6	0.4	0.2			
50	SK	54	44	52	180	210	176	0.47	0.09	0.38	0.38	0.16	0.22	0.28	0.22	0.06
51	AS	14			278			0.48	0.26	0.22						
52	RK	54	36	24	138	240	386	0.81	0.38	0.43	0.7	0.51	0.19	0.36	0.2	0.16
53	JYOTI	54	42	46	180	210	204	0.3	0.2	0.1	0.42	0.23	0.19	0.38	0.18	0.2
54	R	31	24	32	300	340	310	0.8	0.6	0.2	0.44	0.28	0.16	0.72	0.4	0.32
55	RK	18	24	28	180	210	164	0.35	0.21	0.14	0.32	0.11	0.21	0.4	0.31	0.09
56	DS	54	58	50	168	188	210	0.2	0.1	0.1	0.32	0.18	0.14	0.3	0.1	0.2
57	ASW	82	60	62	140	156	180	0.4	0.28	0.12	0.32	0.16	0.16	0.24	0.1	0.14
58	GS	49	30	38	168	230	196	0.09	0.05	0.04	0.42	0.24	0.18	0.4	0.3	0.1
59	BK	112	80	54	206	224	280	0.3	0.19	0.11	0.45	0.31	0.14	1.24	0.84	0.4
60	RS	68	88	76	124	160	188	0.3	0.2	0.1	0.44	0.21	0.23	0.28	0.1	0.18
61	PS	64	52	46	168	204	190	0.27	0.13	0.14	0.32	0.12	0.2	0.42	0.22	0.2
62	BS	56	65	46	230	182	250	0.32	0.21	0.11	0.34	0.12	0.22	0.41	0.2	0.21
63	GS	32	43	26	180	210	244	0.39	0.06	0.33	0.32	0.18	0.14	0.44	0.34	0.1
64	RS	103.9	88	78	260	276	194	0.32	0.14	0.18	0.29	0.16	0.13	0.41	0.17	0.24
65	JP	108	90	104	140	168	154	0.38	0.21	0.17	0.28	0.12	0.16	0.41	0.17	0.24
66	AK	44	54	45	318	324	344	0.32	0.16	0.16	0.29	0.15	0.14	0.42	0.21	0.21
67	PK	34	40	28	180	256	275	0.27	0.14	0.13	0.22	0.1	0.12	0.34	0.18	0.16
68	RK	28.2	31.2	26.3	191	330	340	2.21	0.28	1.93	1.45	0.78	0.67	0.84	0.44	0.4
69	VK	34	26	30	288	342	320	0.47	0.11	0.36	0.5	0.31	0.19	0.21	0.11	0.1
70	SP	48	42	40	157	180	188	0.4	0.1	0.3	0.32	0.16	0.16	0.4	0.28	0.22
71	AC	36	44	46	189	310	288	0.32	0.16	0.16	0.22	0.08	0.14	0.44	0.2	0.24
72	AS	32	28	22	320	280	292	0.24	0.1	0.14	0.42	0.22	0.2	0.32	0.14	0.18

SR. NO	PATIENT'S NAME	SGOT_at initiation (U/L)	SGOT_at 3 month (U/L)	SGOT_at 6 month (U/L)	SGPT_at initiation (U/L)	SGPT_at 3 month (U/L)	SGPT_at 6 month (U/L)	ALP_at initiation (IU/L)	ALP_at 3 month (IU/L)	ALP_at 6 month (IU/L)	Serum total protein_at initiation (gm/dl)	Serum total protein_at 3 month(gm/dl)	Serum total protein_at 6 month(gm/dl)	Serum albumin_at initiation(gm/dl)	Serum albumin_at 3 month(gm/dl)	Serum albumin_at 6 month(gm/dl)
37	AS	3	14	12	10	14	9	138	156	144	6.2	6.4	6.3	3.99	3.4	3.5
38	RB	12	8	23	10	24	12	158	196	180	6.2	6.3	6	3.5	3.2	3.1
39	BK	29	13		17	28		88	130		5.9	5.2		2.64	2.1	
40	JS	12	24	13	10	8	17	198	168	136	6.3	6.6	5.8	3.1	3.2	2.7
42	BS	12	14	20	8	20	12	184	210	224	6.5	6	6.1	3.1	2.8	3.2
43	SS	18	12	24	14	20	8	585	603	576	6.8	6.5	6.7	3.87	3.1	3.3
44	KS	16	10	8	22	20	16	168	206	216	7.1	6.8	6.7	3.81	3.42	3.34
45	BP	12	20	13	18	12	12	120	128	152	7.1	6.4	6.3	3.8	3	3.2
46	MS	24	20	14	22	18	10	197	158	142	6.4	6.6	6.8	3.42	3.6	3.62
47	SS	12	8	26	10	24	12	130	188	158	7	6.8	6.4	3.8	3.2	3
48	MK	12	14	8	10	12	20	556	488	450	7.1	6.4	6.8	3.5	3.2	3.3
49	SK	12	24		10	14		456	503		5.3	5.8		2.2	2.1	
50	SK	21.8	14	8	12.2	18.8	12	227	198	196	7	6.6	6.8	4.22	4.1	3.8
51	AS	23			15			256			6.1			2.1		
52	RK	35	52	48	31	45	64	548	466	589	5.3	5	5.4	2.1	2.5	1.87
53	JYOTI	12	6	4	8	8	6	154	168	196	7.5	6.8	6.5	3.9	3.1	2.9
54	R	12	16	14	10	8	10	382	188	218	5.6	4.8	5.1	2.3	2	2.23
55	RK	15	14	8	13	10	12	83	98	104	5.7	5.8	6.2	3.27	3	3.1
56	DS	8	10	15	6	4	11	88	96	104	6.59	6.9	7.1	3.59	3.7	3.9
57	ASW	12	14	8	8	12	6	160	188	134	7.2	6.8	6.8	3.5	3.2	3.4
58	GS	13	12	8	10	8	6	141	156	150	7.5	7.4	6.8	4.2	4.1	3.8
59	BK	83	112	143	48	62	60	150	196	154	6.1	5.8	5.4	3.35	3.1	2.8
60	RS	8	12	14	12	8	10	132	158	98	7.4	6.8	7.2	3.9	3.6	3.7
61	PS	29	18	9	18	10	22	436	532	398	5.3	5.8	5.4	2.4	2.8	2.2
62	BS	16	20	17	10	12	16	196	176	210	7.1	6.8	6.6	3.8	3.6	3.1
63	GS	24	12	30	17	8	16	46	88	96	7	7.4	6.8	4.8	3.8	4.1
64	RS	8	10	14	12	13	8	108	92	96	6.7	6.6	6.8	4.2	4	3.8
65	JP	20	12	8	12	10	10	124	128	116	6.43	6.68	6.57	4.05	4.66	3.81
66	AK	8	14	20	12	10	8	96	104	32	6.4	6.8	6.8	3.39	4.07	7.7
67	PK	12	10	16	18	8	20	168	198	255	6.8	6.5	6.7	3.4	3.7	3.3
68	RK	52	62	50	27	28	36	256	403	444	6.3	6.8	6.5	3.24	3.4	3.5
69	VK	12	16	17	10	12	10	158	230	204	6.1	5.8	5.4	2.2	2.18	2.4
70	SP	12	14	12	10	15	8	156	160	200	5.8	6.4	6.8	3.2	3.4	3.5
71	AC	16	10	14	12	18	16	254	198	304	7.1	6.8	6.5	4.1	3.7	3.5
72	AS	22	16	20	15	10	8	180	196	168	6.8	6.6	6	3.2	3.3	2.8

SR. NO	PATIENT'S NAME	frequency of hemodialysis per week	Biweekly/ Incrementalmental	Increased/Static	Trend of Increase	transition to more frequent hemodialysis	indication for more frequent transition	no of admissions	cause of admission	Death	Duration of Hemodialysis after which death occurred	total no of dialysis sessions	baseline_domain 1 raw score
37	AS	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		2	HERPES ZOSTER INFECTION, LRTI(FUNGAL SEPSIS)	N		52	20
38	RB	EVERY 10 DAYS -1 MONTH, TWICE WEEKLY -5 MONTHS	Incremental	increase	0.7/w to 2/w	Yes	volume overload	1	volume overload	N		42	20
39	BK	TWICE WEEKLY - 4 MOTNS	Regular	static	2/w	No		0		Y	EXPIRED AFTER 4 MONTHS DUE TO COVID PNEUMONITIS	32	15
40	JS	WEEKLY-1 MONTH, TWICE WEEKLY 5 MONTH	Incremental	increase	1/w to 2/w	Yes	uremic symptoms	0		N		43	20
42	BS	WEEKLY-3 MONTH, TWICE WEEKLY 3MONTH	Incremental	increase	1/w to 2/w	Yes	volume overload	0		N		36	20
43	SS	TWICE WEEKLY - 1 MONTH, THRICE WEEKLY - 5 MONTHS	Incremental	increase	2/w to 3/w	Yes	volume overload	1	VOLUME OVERLOAD	N		64	20
44	KS	WEEKLY - 6 MONTHS	Incremental	static	1/w	No		0		N		26	19
45	BP	WEEKLY-2MONTHS, TWICE WEEKLY-4MONTHS	Incremental	increase	1/w to 2/w	Yes	volume overload	1	VOLUME OVERLOAD	N		40	18
46	MS	WEEKLY-4 MONTHS, TWICE WEEKLY-2MONTHS	Incremental	increase	1/w to 2/w	Yes	uremic symptoms	1	UREMIC SYMPTOMS	N		33	18
47	SS	WEEKLY - 6 MONTHS	Incremental	static	1/w	No		0		N		26	20
48	MK	EVERY 10 DAYS -4 MONTH, WEEKLY -2 MONTHS	Incremental	increase	0.7/w to 1/w	Yes	uremic symptoms	1	HYPONATREMIA	N		21	18
49	SK	WEEKLY-1 MONTH, TWICE WEEKLY 3 MONTH	Incremental	increase	1/w to 2/w	Yes	uremic symptoms	1	UREMIC SYMPTOMS	Y	EXPIRED AFTER 4 MONTHS DUE TO SUDDEN CARDIAC DEATH	32	14
50	SK	EVERY 15 DAYS-5 MONTHS, EVERY 10 DAY-1 MONTH	Incremental	increase	0.5/w to 0.7/w	Yes	uremic symptoms	0		N		14	21
51	AS	TWICE WEEKLY -2 MONTHS	Regular	static	2/w	No		0		Y	EXPIRED AFTER 2 MONTHS DUE TO CARDIOGENIC SHOCK	9	14
52	RK	TWICE WEEKLY-4MONTHS, THRICE WEEKLY-2 MONTHS	Incremental	increase	2/w to 3/w	Yes	volume overload	2	VOLUME OVERLOAD, VOLUME OVERLOAD	N		56	20
53	JYOTI	EVERY 10 DAYS- 2 MONTHS, WEEKLY -4 MONTHS	Incremental	increase	0.7/w to 1/w	Yes	uremic symptoms	0		N		22	20
54	R	ONCE WEEKLY-3 MONTHS, TWICE WEEKLY-3 MONTHS	Incremental	static	1/w to 2/w	No		0		N		36	20
55	RK	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		1	SEVERE ANEMIA	N		52	19
56	DS	EVERY 15 DAY-4 MONTHS, EVERY 10 DAY- 2MONTHS	Incremental	increase	0.5/w to 0.7/w	Yes	uremic symptoms	0		N		14	21
57	ASW	WEEKLY-3 MONTH, TWICE WEEKLY -3MONTH	Incremental	increase	1/w to 2/w	Yes	PERSITANT HYPERKALEMIA	0		N		36	21
58	GS	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		0		N		53	19
59	BK	TWICE WEEKLY-1 MONTH, THRICE WEEKLY -5 MONTH	Incremental	increase	2/w to 3/w	Yes	uremic symptoms	1	VOLUME OVERLOAD	N		68	20
60	RS	EVERY 10 DAYS	Incremental	static	0.7/w	No		0		N		18	19
61	PS	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		1	UREMIC SYMPTOMS	N		53	21
62	BS	WEEKLY-6 MONTHS	Incremental	static	1/w	No		0		N		26	21
63	GS	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		0		N		52	22
64	RS	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		0		N		53	23
65	JP	WEEKLY-3 MONTHS, TWICE WEEKLY- 3 MONTHS	Incremental	increase	1/w to 2/w	Yes	uremic symptoms	0		N		36	18
66	AK	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		0		N		52	21
67	PK	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		1	VOLUME OVERLOAD	N		53	21
68	RK	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		0		N		53	18
69	VK	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		0		N		52	19
70	SP	TWICE WEEKLY-6 MONTHS	Regular	static	2/w	No		2	ACCELERATED HYPERTENSION	N		52	19
71	AC	EVERY 10 DAY-3 MONTHS, WEEKLY-3 MONTHS	Incremental	increase	0.7/w to 1/w	Yes	uremic symptoms	1	UREMIC SYMPTOMS	N		22	20
72	AS	TWICE WEEKLY-4MONTHS, THRICE WEEKLY-2 MONTHS	Incremental	increase	2/w to 3/w	Yes	volume overload	2	VOLUME OVERLOAD, VOLUME OVERLOAD	N		44	23

SR. NO	PATIENT'S NAME	baseline_domain 1transformed score (4-20)	baseline_domain 1 transformed score (0-100)	baseline_domain 2 raw score	baseline_domain 2 transformed score (4-20)	baseline_domain 2 transformed score(0-100)	baseline_domain 3 raw score	baseline_domain 3 transformed score (4-20)	baseline_domain 3 transformed score (0-100)	baseline_domain 4 raw score	baseline_domain 4 transformed score (4-20)	baseline_domain 4 transformed score (0-100)	At 6month_domain 1 raw score	At 6month_domain 1transformed score (4-20)
37	AS	11	44	19	13	56	9	12	50	20	10	38	22	13
38	RB	11	44	20	13	56	9	12	50	20	10	38	16	9
39	BK	9	31	18	12	50	6	8	25	17	9	31		
40	JS	11	44	18	12	50	8	11	44	19	10	38	18	10
42	BS	11	44	20	13	56	8	11	44	23	12	50	22	13
43	SS	11	44	19	13	56	7	9	31	19	10	38	18	10
44	KS	11	44	21	14	63	8	11	44	22	11	44	22	13
45	BP	10	38	21	14	63	8	11	44	21	11	44	22	13
46	MS	10	38	19	13	56	8	11	44	23	12	50	23	13
47	SS	11	44	20	13	56	9	12	50	21	11	44	24	14
48	MK	10	38	19	13	56	8	11	44	21	11	44	20	11
49	SK	8	25	17	11	44	5	7	19	18	9	31		
50	SK	12	50	21	14	63	9	12	50	22	11	44	25	14
51	AS	8	25	16	11	44	5	7	19	18	9	31		
52	RK	11	44	21	14	63	8	11	44	22	11	44	24	14
53	JYOTI	11	44	19	13	56	7	9	31	21	11	44	16	12
54	R	11	44	20	13	56	9	12	50	21	11	44	18	10
55	RK	11	44	21	14	63	8	11	44	20	10	38	21	12
56	DS	12	50	21	14	63	8	11	44	23	12	50	26	15
57	ASW	12	50	22	15	69	8	11	44	21	11	44	23	13
58	GS	11	44	21	14	63	9	12	50	22	11	44	23	13
59	BK	11	44	22	15	69	9	12	50	21	11	44	16	12
60	RS	11	44	21	14	63	8	11	44	20	10	38	24	14
61	PS	12	50	19	13	56	8	11	44	22	11	44	22	13
62	BS	12	50	18	12	50	9	12	50	23	12	50	26	15
63	GS	13	56	19	13	56	10	13	56	23	12	50	18	10
64	RS	13	56	21	14	63	10	13	56	22	11	44	24	14
65	JP	10	38	20	13	56	10	13	56	21	11	44	19	11
66	AK	12	50	19	13	56	9	12	50	20	10	38	23	13
67	PK	12	50	19	13	56	9	12	50	21	11	44	23	13
68	RK	10	38	21	14	63	8	11	44	19	10	38	22	13
69	VK	11	44	20	13	56	8	11	44	20	10	38	23	13
70	SP	11	44	21	14	63	9	12	50	22	11	44	20	11
71	AC	11	44	19	13	56	8	11	44	20	10	38	21	12
72	AS	13	56	19	13	56	7	9	31	19	10	38	16	12

SR. NO	PATIENT'S NAME	At 6month_domain 1 transformed score (0-100)	At 6month_domain 2 raw score	At 6month_domain 2 transformed score (4-20)	At 6month_domain 2 transformed score(0-100)	At 6month_domain 3 raw score	At 6month_domain 3 transformed score (4-20)	At 6month_domain 3 transformed score (0-100)	At 6month_domain 4 raw score	At 6month_domain 4 transformed score (4-20)	At 6month_domain 4 transformed score (0-100)
37	AS	56	19	13	56	10	13	56	25	13	56
38	RB	21	15	10	38	7	9	31	18	9	31
39	BK										
40	JS	38	17	11	44	8	11	44	20	10	38
42	BS	56	21	14	63	10	13	56	27	14	63
43	SS	38	16	11	44	5	7	19	16	8	25
44	KS	56	23	15	69	10	13	56	25	13	56
45	BP	56	24	16	75	11	15	69	27	14	63
46	MS	56	23	15	69	11	15	69	29	15	69
47	SS	63	24	16	75	12	16	75	30	15	69
48	MK	44	19	13	56	10	13	56	23	12	50
49	SK										
50	SK	63	24	16	75	11	15	69	28	14	63
51	AS										
52	RK	63	23	15	69	11	15	69	29	15	69
53	JYOTI	50	16	11	44	6	8	25	18	9	31
54	R	38	19	13	56	10	13	56	22	11	44
55	RK	50	23	15	69	11	15	69	24	12	50
56	DS	69	25	17	81	11	15	69	30	15	69
57	ASW	56	24	16	75	11	15	69	27	14	63
58	GS	56	24	16	75	12	16	75	26	13	56
59	BK	50	20	13	56	6	8	25	19	10	38
60	RS	63	23	15	69	11	15	69	27	14	63
61	PS	56	22	15	69	10	13	56	26	13	56
62	BS	69	23	15	69	11	15	69	30	15	69
63	GS	38	19	13	56	9	12	50	25	13	56
64	RS	63	22	15	69	10	13	56	28	14	63
65	JP	44	22	15	69	10	13	56	25	13	56
66	AK	56	21	14	63	11	15	69	25	13	56
67	PK	56	21	14	63	11	15	69	26	13	56
68	RK	56	22	15	69	11	15	69	24	12	50
69	VK	56	22	15	69	11	15	69	26	13	56
70	SP	44	20	13	56	11	15	69	26	13	56
71	AC	50	23	15	69	10	13	56	25	13	56
72	AS	50	15	10	38	6	8	25	15	8	25

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No. BFUHS/2K21p-TH/ 199 Date 6/1/2022

The Principal,
DMC, Ludhiana.

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 29.10.2021 has approved the plan of thesis of **Abhinav Kumar**, a student of your college for **DM Nephrology** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
To study the effectiveness and outcome of incremental hemodialysis in end stage renal disease patients.

Supervisor
Dr. Vikas Makkar
Prof. & Head,
Dept. of Nephrology,
DMCH, Ludhiana.

Co-Supervisor

Dr. Sandeep Puri
Prof.,
Dept. of Medicine,
DMCH, Ludhiana.

Dr. Simran Kaur
Asst. Prof.,
Dept. of Nephrology,
DMCH, Ludhiana.

The student has to submit the four copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,(if any).

Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

187. If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.

188 The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.

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TO STUDY THE EFFECTIVENESS AND OUTCOME OF INCREMENTAL HEMODIALYSIS IN END STAGE RENAL DISEASE PATIENTS

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

D.M

in

NEPHROLOGY

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

AUGUST, 2021

DR. ABHINAV KUMAR

DEPARTMENT OF NEPHROLOGY

DAYANAND MEDICAL COLLEGE & HOSPITAL,

LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	**TO STUDY THE EFFECTIVENESS AND OUTCOME OF INCREMENTAL HEMODIALYSIS IN END STAGE RENAL DISEASE PATIENTS**
For the degree of	D.M Nephrology
Name of the candidate	Dr. Abhinav Kumar
Supervisor	Dr Vikas Makkar, Professor And Head, Department of Nephrology, DMCH, Ludhiana
Co-supervisor	Dr. Sandeep Puri, Principal & Professor, Department of Medicine, DMCH, Ludhiana Dr. Simran Kaur, Assistant Professor, Department Nephrology, DMCh, Ludhiana
Institution	Dayanand Medical College & Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Hemodialysis prescription is empiric, which leads to complications related to under-dialysis. Twice-weekly maintenance hemodialysis is not an accepted form of hemodialysis primarily because there are not enough studies to prove its sustainability. However, with the concept of incremental dialysis and residual renal function (RRF) is gaining ground, this can prove to be a good option for initiation of hemodialysis.

Aim of Study: To evaluate the effectiveness and outcome of incremental hemodialysis in end stage renal disease patients

Materials & Methods: This will be an observational prospective cohort study and will include the patients initiating hemodialysis from August 2021 to May 2022 and will be followed for 6 months.

Clinical Significance: More frequent dialysis are associated with a better quality of life and improvement in biochemical parameters but due to limited health resources and poor socio-economic status , it is not affordable by every End Stage Renal Disease(ESRD) patients. After the concept of Residual Renal Function , incremental hemodialysis may be a good option.

Keywords: Hemodialysis, Incremental Hemodialysis, Residual Renal Function

(Signature)	(Signature)	(Signature)	(Signature)	(Signature)
Candidate	Supervisor	Co-Supervisor	Co-Supervisor	Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"TO STUDY THE EFFECTIVENESS AND OUTCOME OF INCREMENTAL HEMODIALYSIS IN END STAGE RENAL DISEASE PATIENTS"** exist in the Department of Nephrology, DMC&H, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis is genuine and is collected by the candidate himself under our supervision and guidance.

Supervisor

Dr. Vikas Makkar
Professor & Head
Department of Nephrology
DMCH, Ludhiana

Co-Supervisors

Dr. Sandeep Puri
Principal & Professor
Department of Medicine
DMCH, Ludhiana

Dr. Simran Kaur,
Assistant Professor,
Department Nephrology,
DMCH, Ludhiana

Head of the Department

Dr. Vikas Makkar
Professor & Head
Department of Nephrology
DMCH, Ludhiana

Place:

Date :

APPROVAL PROFORMA
BY RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

Name of candidate	Dr. Abhinav Kumar
Department	Nephrology
Topic of Thesis	**TO STUDY THE EFFECTIVENESS AND OUTCOME OF INCREMENTAL HEMODIALYSIS IN END STAGE RENAL DISEASE PATIENTS**
Likely date of appearing in PG examination	May-JUne 2023
Date of enrollment	8.2.2021
Name of Head of Department	Dr. Vikas Makkar
1. Supervisor **2. Co-Supervisor**	Dr. Vikas Makkar Dr. Sandeep Puri Dr. Simran Kaur
Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
Dr. Harpreet Kaur (Professor & Head, Pathology)	Mr. R K Sharma (Legal Expert)
Dr. Jaspal Singh (Professor & Head, Surgery)	Dr. Ramit Mahajan (Associate Professor, Gastroenterology)
Dr. Dinesh Gupta (Professor & Head, Medicine)	Dr. Anu Sharma (Professor, Anatomy)
Dr. Sandeep Kaushal (Dean Academics & Professor & Head, Pharmacology)	Dr. Sandeep Kaushal (Dean Academics & Professor & Head, Pharmacology)
Dr. Gurpreet S Wander (Vice Principal)	Dr. Gurpreet S Wander (Vice Principal & Professor & Head, Cardiology)
	Dr. Gagandeep Singh (Secretary, Ethics Committee Professor & Head, Neurology)

Approved: Yes / No

Dr. Sandeep Puri
Chairperson
Research Committee
Chairperson
Research Committee

Approved: Yes / ~~No~~

Prof. Arvind Malhotra
Chairperson
Ethics Committee
Chairperson
Ethics Committee

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

1	NAME OF THE CANDIDATE AND ADDRESS	Dr. ABHINAV KUMAR
2	NAME OF THE INSTITUTE	Dayanand Medical College, Ludhiana.
3	COURSE OF STUDY AND SUBJECT	D.M., Nephrology
4	DATE OF ADMISSION OF COURSE	8th FEB 2021
5	TITLE OF THE TOPIC	To study the effectiveness and outcome of incremental hemodialysis in end stage renal disease patients.

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

In India, hemodialysis prescription is empiric, which leads to complications related to under-dialysis. Developing countries have limited resources and a formidable load of patients requiring dialysis. In a country like India with 17% of the world population, the majority do not have access to basic healthcare facilities.[1] The primary goal of healthcare initiatives is to provide quality care and concurrently rationalize costs. In underdeveloped nations, nephrologists are well versed with the concept of twice-weekly hemodialysis, which is an unspoken accepted norm. Thrice-weekly hemodialysis was a concept introduced three decades ago and requires consideration in the present-day scenario of sophisticated dialysis machines, advanced dialysis membranes, and ultrapure water. [2]

Twice-weekly maintenance hemodialysis is not an accepted form of hemodialysis primarily because there are not enough studies to prove its sustainability. However, with the concept of incremental dialysis and residual renal function (RRF) is gaining ground, this can prove to be a good option for initiation of hemodialysis.

Over time, there has been increasing recognition of the importance of preservation of residual kidney function (RKF) in dialysis patients. The presence of RKF has been shown to contribute to the overall health and well-being of dialysis patients including improved survival, better nutrition, and reduced inflammation. Residual kidney function (RKF) in patients with end-stage renal disease plays a critical role in dialysis adequacy, quality of life, and survival by maintaining fluid and metabolic homeostasis, mitigating mineral abnormalities, optimizing uremic toxin clearance, and sustaining higher production of endogenous vitamin D and erythropoietin. [3-5] When patients who have sufficient urine output are given twice-weekly HD, they maintain dialysis adequacy and exhibit better preservation of RRF than patients on thrice-weekly HD. [6]

A stepped dialysis regimen with scheduled transition from time-delineated twice-weekly HD to thrice-weekly HD could represent an effective and safe strategy to standardize incremental HD in patients with CKD transitioning to early-stage ESKD.

The progression of CKD (i.e., regression of residual kidney function [RKF]) is usually gradual, over a matter of months to years, transition to dialysis therapy should be incremental and follow a reverse mirror image of RKF, starting with lower-clearance hemodialysis prescriptions and building up to higher-clearance hemodialysis regimens.

In 2014, an expert opinion paper argued that the mortality rate in patients who transition from predialysis CKD to incident kidney failure is highest in the first months of hemodialysis therapy and that the outright initiation with a thrice-weekly or more frequent hemodialysis regimen, by virtue of causing faster decline in RKF, might be a cause of this sudden surge in death.[7]

This study will be conducted to demonstrate the effectiveness and outcome of incremental hemodialysis in end stage renal disease patients.

6.2 REVIEW OF LITERATURE

Chronic kidney disease (CKD) is a devastating disease with profound physical morbidity associated with financial, social and emotional stress on the individual. The definition of CKD is based on the presence of kidney damage (i.e., albuminuria) or decreased kidney function (i.e., glomerular filtration rate <60 mL/min/ 1.73 m2) for 3 months or more. The term “end- stage renal disease” (ESRD) generally refers to CKD treated with either dialysis or transplantation. The age-adjusted incidence rate of ESRD in India has been estimated to be 229/million population.[8] Prevalence seems to be increasing particularly in older individuals, and partly because of an increasing prevalence of diabetes and hypertension.[9] Financial burden for dialysis and transplantation are increasing alongside costs for other chronic diseases.

Hemodialysis is the mainstay therapy which is offered for ESRD patients who cannot undergo renal transplantation. The main purpose of hemodialysis is the provision of sufficient and safe patient treatment, which contributes to the better physical condition of the patient and it prevents further problems and complications that are due to uremia[10]. With regards to HD adequacy targets, it is only the ‘golden rule’ for 1.2 single-pool Kt/V for thrice-weekly regimens that has been remembered in most dialysis-therapy practicing circles. To that end, thrice-weekly HD has continued to be regarded as the standard of care of HD treatment for patients with end-stage renal disease (ESRD) [11]. Whereas thrice-weekly HD appears to be an appropriate treatment for many ESRD patients, they continue to show markedly decreased health-related quality of life (HRQoL) and survival.[7]

The standardized Kt/V is a method to measure the clearance efficiency of HD of variable frequency, slow continuous renal replacement therapies, residual renal function (RRF) and all situations involving the use of clearance from various methods.[12] Doses of dialysis represented by Kt/V measurements <1.20 are widely considered inadequate. Below this level, each 0.10 decrease in Kt/V is estimated to increase the relative risk of death by 7%.[13]

Mendonca S et al. (2021) did a 3-year observational cohort study of patients initiated on twice-weekly hemodialysis. All the patients regardless of their RRF were initiated on twice-weekly hemodialysis. Children, pregnant women, patients being worked up for renal transplant, and patients on peritoneal dialysis were excluded from the study. Adequacy of dialysis and basic cost-effective hematological and biochemical parameters were studied monthly in each patient. In case of complications in the form of recurrent fluid overload, uncontrolled hypertension, refractory anemia, hyperphosphatemia despite being on phosphate binders, and features of malnutrition, the patient was shifted to thrice-weekly hemodialysis. Over a period of 3 years, 88 incident hemodialysis patients were followed up. They found that twice-weekly dialysis provided acceptable adequacy in a majority of patients. The nutritional, hematological, and biochemical parameters were in an admissible range and were sustained over a period of time. The mortality rates were comparable to thrice-weekly hemodialysis. [14]

Wolley MJ et al (2019) did a study on incremental and twice weekly haemodialysis in Australia and New Zealand. The cohort included all adults started on HD between 2004-2015. The primary outcome was all-cause mortality (primary), cardiovascular and non-cardiovascular mortality (secondary). The total cohort comprised 27 981 patients, of which 27 513 subjects with complete dialysis frequency data were used for analysis, with 970 528 patient months of follow up. The overall prevalence of incremental dialysis in the cohort was 3%. Compared to conventional patients, incremental dialysis patients were older, had a lower body mass index, had a higher starting estimated glomerlular filtration rate and had less diabetes. In a multivariate model, incremental start dialysis was not associated with all-cause mortality (hazard ratio (HR) = 1.03, 95% confidence interval (CI) = 0.92–1.16) or cardiovascular mortality (HR = 0.87, 95% CI = 0.71–1.07), but was associated with an increased risk of non-cardiovascular mortality (HR = 1.25, 95% CI = 1.11–1.42). They concluded that Incremental dialysis was used infrequently, and there was evidence of patient level differences. The all-cause mortality was similar, but there were

differences in cause specific mortality. Hence, Incremental dialysis needs to be tested in prospective trials to define the safety and efficacy of this approach.[15]

Y Liu et al (2019) did a systematic review and meta-analysis on Incremental haemodialysis (HD) regimen , its efficacy and safety, compared with conventional thrice-weekly HD to evaluate the benefits and limitations of incremental HD regimen in patients with ESRD. They included 16 studies (N = 252,330), including 15 observational studies and 1 cross-sectional study. They observed that Incremental HD reduced mortality risk compared with conventional HD. Renal function and urine volume were also better preserved in patients on incremental HD. Other clinical outcomes, including serum levels of calcium, phosphate, albumin, haemoglobin, and hospitalization rate, were similar between groups. They concluded that incremental therapeutic approach as a beginning HD regimen is associated with lower mortality and better preservation of greater residual renal function. The limitation of the study was no RCT studies were included hence there is an urgent need for well-designed randomized controlled trials in future.[16]

Carlo Garfalo et al(2019) conducted a systematic review and meta-analysis of 22 studies with 75292 patients , 15 in HD (Haemodialysis) and 7 in PD(Peritoneal Dialysis) on outcome of incremental dialysis in patients with ESRD. They came to know that Incremental dialysis allows longer preservation of residual kidney functions thus deferring full dose dialysis by about one year in both HD and PD with no increase in mortality risk. [17]

Mathew AT et al(2018) did a review on incremental dialysis in preservation of RKF (Residual Kidney Function) and recommended careful patient selection for initiation of incremental approach to HD to maximise treatment success. Substantial RKF is the most important criteria to determine the HD frequency and suggests twice weekly HD only to be initiated if KRU is > 3ml/min per 1.73 kg/m2 and target urine volume of >0.5L/day. [18]

Obi Y et al (2016) did a longitudinal cohort study in United States on 23,645 patients initiated on maintenance hemodialysis. They compared

outcomes of incremental (routine twice weekly for >6 continuous weeks during the first 91 days upon transition to dialysis) versus conventional (thrice weekly) hemodialysis regimens during the same time. The study outcome included changes in renal urea clearance and urine volume during 1 year after the first quarter and survival after the first year. They found that incremental hemodialysis may be safe treatment in patients with substantial RKF but is associated with high mortality at end of one year in low RKF individuals. However the study had limitation of selection bias and large CI and has suggested more clinical trials to study effectiveness of twice weekly HD.[19]

In the incremental dialysis expert opinion study by Kalantar-Zadeh et al.(2014) , urine volume >0.5 L per day and a Kur of at least 3 mL/min were 2 of 10 criteria that were mainly proposed to identify candidates for twice-weekly HD. Furthermore, apart from these 2 criteria based on RKF, the patient should meet 5 or more (out of 9) other criteria (i.e., intradialytic weight gain 2.5 kg; stable cardiovascular status; infrequent hospitalization; satisfactory health-related quality of life; small to normal body size; good nutritional status; and absence of hyperkalemia, hyperphosphatemia, or profound anemia). Periodic monitoring of these criteria will determine the timing for increasing dialysis dose and frequency. They recognized that twice-weekly HD represents a major paradigm shift for many clinicians and jurisdictions. Therefore, they proposed to conduct randomized controlled trials of twice-weekly vs. thrice-weekly HD to assess the potential of twice-weekly HD to improve survival and health related quality of life while simultaneously reducing costs, protecting fragile vascular accesses, and optimizing resource use.[7]

6.3 AIMS AND OBJECTIVES OF THE STUDY

To evaluate the effectiveness and outcome of incremental hemodialysis in end stage renal disease patients.

7. MATERIALS AND METHODS

7.1 Source of Data

Study Design:

Observational prospective cohort study

The patients initiating hemodialysis from August 2021 to May 2022 will be included in the study and will be followed up for 6 months.

7.2 Methods of collection of Data

Inclusion criteria

1. Patients being initiated for maintenance hemodialysis
2. Age >18 years and <65 years, either gender

Exclusion criteria

1. Patients with acute on chronic kidney disease
2. Patients on continuous ambulatory peritoneal dialysis
3. Patients being worked up for renal transplant
4. Pregnancy
5. Having active malignancy with very short life expectancies
6. Chronic debilitating diseases with short life expectancies
7. Patients not consenting for inclusion in the study.

After a written informed consent, patient's detailed history, physical examination and investigations will be recorded as per the predefined and well-structured proforma attached in appendix.

Overview of parameter to be studied will include:

Demographic details including name, age, gender, address, contact details etc.

History of present illness will be recorded including native disease and total duration of disease. Detailed general physical examination and systemic examination of respiratory, cardiovascular, central nervous system, vascular access for hemodialysis will be done. Dietary history of the patient will be taken and nutritional assessment will be done, when required. Laboratory parameters studied will include hemoglobin, total protein, albumin, fasting lipid profile, serum uric acid, serum calcium, serum phosphorus, intact parathyroid hormone (iPTH), vitamin-D, alkaline phosphatase. Laboratory parameters will be done at

baseline, monthly or three monthly as per KDIGO guidelines for CKD patients.

2-D Echocardiography will be done if needed.

The criteria to enroll the patients in study, initiated on maintenance hemodialysis will be after exclusion of any recent precipitating factors leading to acute on CKD, symptoms or signs attributable to kidney failure (serositis, acid-base or electrolyte abnormalities, pruritus); inability to control volume status or blood pressure; a progressive deterioration in nutritional status refractory to dietary intervention; or cognitive impairment or eGFR <5ml/min according to KDIGO guidelines.

Each hemodialysis session will be tried to make adequate according to Kt/V >1.2, where K is the dialyzer blood water urea clearance, t is dialysis session length and V is distribution of volume of Urea.

Residual kidney function will be calculated at the initiation, at the end of 3 months and 6 months. It will be calculated after 12 hour collection of urine prior to hemodialysis, through the mean of creatinine clearance rate and urea clearance rate. Creatinine clearance will be calculated by Ucr × V/ Pcr. Where, Ucr is concentration of creatinine in urine, V is urine flow rate and Pcr is plasma creatinine concentration, and urea clearance will be calculated by Uur×V/Pur, where Uur is concentration of urea in urine, V is urine flow rate and Pur is concentration of urea in plasma.

The criteria for transition from twice weekly to thrice weekly hemodialysis will be according to KDOQI guidelines, residual renal function < 2 ml/minute as per creatinine clearance.

OUTCOME

Primary outcomes will include:

All cause mortality

Secondary outcomes will include:

Residual renal function, Quality of life (QoL) index, Incidence of transition to more frequent hemodialysis, any morbidity including number of hospitalization episodes.

Quality of life (QoL) index, will be studied based on WHOQOL-BREF score.

STATISTICAL ANALYSIS

Data will be described in terms of range; mean ±standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. Paired t test will be performed to compare the outcome. For comparing categorical data, Chi square ($\chi 2$) test will be performed and exact test will be used when the expected frequency is less than 5. A probability value (p value) less than 0.05 was considered statistically significant. All statistical calculations will be done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

Yes. Patients included in the study will have to undergo hematological, biochemical or radiological investigations as per the protocol. For these patients included in the study will be informed regarding their inclusion and written informed consent will be taken for all the patients included in the study.

7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Yes, attached herewith

8. LIST OF REFERENCES

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PROFORMA

SR.NO:

PATIENT'S NAME:

FATHER'S NAME:

AGE:

SEX:

MRD NO:

PHONE NO:

ADDRESS:

DATE OF INITIATION OF HEMODIALYSIS:

HEIGHT:

WEIGHT:

Native disease with duration

PAST HISTORY: Diabetes Hypertension Autoimmune disease others

FAMILY HISTORY: +/-

PERSONAL HISTORY

Smoking Alcohol Any other drug abuse

Signature of Candidate

Signature of Supervisor

GENERAL PHYSICAL EXAMINATION

SPO2

Temperature

JVP

Pallor

Icterus

Clubbing

Cyanosis

Edema

Lymphadenopathy

Pulse

Blood pressure

SYSTEMIC EXAMINATION

Respiratory system

Cardiovascular system

Central nervous system

Abdomen

Eye

ENT

Viral markers for:

Hep B

Hep C

HIV

Other co-morbidities:

Residual renal function:

	Urea clearance	Creatinine clearance	Urine volume (12 hours)	Residual renal function
Base line				
At 3 month				
At 6 month				

2 D Echocardiography:

Baseline:

At 6 month:

Quality of life (QoL) index:

Baseline:

At 6 month:

VASCULAR ACCESS FOR HEMODIALYSIS:

Frequency of Hemodialysis per week:

1. 3 session per week
2. 2 session per week
3. Less than 2 session per week or infrequent

Signature of Candidate

Signature of Supervisor

DETAILS OF HEMODIALYSIS OF EACH SESSION:

Date	Predialysis urea	Postdialysis urea	Postdialysis weight	Ultrafiltrate	Session length	Kt/V for each session	StdKt/V if at least 2 session per week

Signature of Candidate

Signature of Supervisor

Transition to more frequent hemodialysis: YES/NO

If yes, Details:

Other biochemical parameters:

	AT INITIATION	1 MONTH	2 MONTH	3 MONTH	4 MONTH	5 MONTH	6 MONTH
HEMOGLOBIN							
SERUM CALCIUM							
PHOSPHATE							
PTH		------	------		------	------	
VITAMIN D		------	------		------	------	
Serum ferritin		------	------		------	------	
Serum iron		------	------		------	------	
TIBC		------	------		------	------	
Serum bilirubin (T/D/I)		------	------		------	------	
SGOT		------	------		------	------	
SGPT		------	------		------	------	
ALP		------	------		------	------	
Total serum protein		------	------		------	------	
Serum albumin		------	------		------	------	

Signature of Candidate

Signature of Supervisor

WHO/MSA/MNH/PSF/97.4
English only
Distr.: Limited

WHOQOL-BREF

PROGRAMME ON MENTAL HEALTH
WORLD HEALTH ORGANIZATION
GENEVA

For office use only

	Equations for computing domain scores	Raw score	Transformed scores*	
Domain 1	(6-Q3) + (6-Q4) + Q10 + Q15 + Q16 + Q17 + Q18 ☐ + ☐ + ☐ + ☐ + ☐ + ☐ + ☐	=	**4-20**	**0-100**
Domain 2	Q5 + Q6 + Q7 + Q11 + Q19 + (6-Q26) ☐ + ☐ + ☐ + ☐ + ☐ + ☐	=		
Domain 3	Q20 + Q21 + Q22 ☐ + ☐ + ☐	=		
Domain 4	Q8 + Q9 + Q12 + Q13 + Q14 + Q23 + Q24 + Q25 ☐ + ☐ + ☐ + ☐ + ☐ + ☐ + ☐ + ☐	=		

* Please see Table 4 on page 10 of the manual, for converting raw scores to transformed scores.

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I.D. number

ABOUT YOU

Before you begin we would like to ask you to answer a few general questions about yourself: by circling the correct answer or by filling in the space provided.

What is your **gender**? Male Female

What is you **date of birth**? _____ / _____ / _____
Day / Month / Year

What is the highest **education** you received?
None at all
Primary school
Secondary school
Tertiary

What is your **marital status**?
Single Separated
Married Divorced
Living as married Widowed

Are you currently **ill**? Yes No

If something is wrong with your health what do you think it is?_____illness/ problem

Instructions

This assessment asks how you feel about your quality of life, health, or other areas of your life. **Please answer all the questions.** If you are unsure about which response to give to a question, **please choose the one** that appears most appropriate. This can often be your first response.

Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life **in the last two weeks.** For example, thinking about the last two weeks, a question might ask:

	Do you get the kind of support from others that you need?	Not at all 1	Not much 2	Moderately 3	A great deal 4	Completely 5

You should circle the number that best fits how much support you got from others over the last two weeks. So you would circle the number 4 if you got a great deal of support from others as follows.

	Do you get the kind of support from others that you need?	Not at all 1	Not much 2	Moderately 3	A great deal 4	Completely 5

You would circle number 1 if you did not get any of the support that you needed from others in the last two weeks.

Please read each question, assess your feelings, and circle the number on the scale for each question that gives the best answer for you.

		Very poor	Poor	Neither poor nor good	Good	Very good
1(G1)	How would you rate your quality of life?	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
2 (G4)	How satisfied are you with your health?	1	2	3	4	5

The following questions ask about **how much** you have experienced certain things in the last two weeks.

		Not at all	A little	A moderate amount	Very much	An extreme amount
3 (F1.4)	To what extent do you feel that physical pain prevents you from doing what you need to do?	1	2	3	4	5
4(F11.3)	How much do you need any medical treatment to function in your daily life?	1	2	3	4	5
5(F4.1)	How much do you enjoy life?	1	2	3	4	5
6(F24.2)	To what extent do you feel your life to be meaningful?	1	2	3	4	5

		Not at all	A little	A moderate amount	Very much	Extremely
7(F5.3)	How well are you able to concentrate?	1	2	3	4	5
8 (F16.1)	How safe do you feel in your daily life?	1	2	3	4	5
9 (F22.1)	How healthy is your physical environment?	1	2	3	4	5

The following questions ask about **how completely** you experience or were able to do certain things in the last two weeks.

		Not at all	A little	Moderately	Mostly	Completely
10 (F2.1)	Do you have enough energy for everyday life?	1	2	3	4	5
11 (F7.1)	Are you able to accept your bodily appearance?	1	2	3	4	5
12 (F18.1)	Have you enough money to meet your needs?	1	2	3	4	5
13 (F20.1)	How available to you is the information that you need in your day-to-day life?	1	2	3	4	5
14 (F21.1)	To what extent do you have the opportunity for leisure activities?	1	2	3	4	5

		Very poor	Poor	Neither	Good	Very good

				poor nor good		
15 (F9.1)	How well are you able to get around?	1	2	3	4	5

The following questions ask you to say how **good or satisfied** you have felt about various aspects of your life over the last two weeks.

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
16 (F3.3)	How satisfied are you with your sleep?	1	2	3	4	5
17 (F10.3)	How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
18(F12.4)	How satisfied are you with your capacity for work?	1	2	3	4	5
19 (F6.3)	How satisfied are you with yourself?	1	2	3	4	5
20(F13.3)	How satisfied are you with your personal relationships?	1	2	3	4	5
21(F15.3)	How satisfied are you with your sex life?	1	2	3	4	5
22(F14.4)	How satisfied are you with the support you get from your friends?	1	2	3	4	5
23(F17.3)	How satisfied are you with the conditions of your living place?	1	2	3	4	5
24(F19.3)	How satisfied are you with your access to health services?	1	2	3	4	5
25(F23.3)	How satisfied are you with your transport?	1	2	3	4	5

The following question refers to **how often** you have felt or experienced certain things in the last two weeks.

		Never	Seldom	Quite often	Very often	Always
26 (F8.1)	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	1	2	3	4	5

Did someone help you to fill out this form?.....

How long did it take to fill this form out?.....

Do you have any comments about the assessment?

.....

.....

THANK YOU FOR YOUR HELP

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o.....
.....am willing to participate in the study **"TO STUDY THE EFFECTIVENESS AND OUTCOME OF INCREMENTAL HEMODIALYSIS IN END STAGE RENAL DISEASE PATIENTS"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

....

Signature of the Witness Signature of the patient

Name:

Signature of Candidate **Signature of Supervisor**

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य **"TO STUDY THE EFFECTIVENESS AND OUTCOME OF INCREMENTAL HEMODIALYSIS IN END STAGE RENAL DISEASE PATIENTS"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

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गवाह के हस्ताक्षर रोगी के हस्ताक्षर/अंगूठे का निशान

नाम: नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

"TO STUDY THE EFFECTIVENESS AND OUTCOME OF INCREMENTAL HEMODIALYSIS IN END STAGE RENAL DISEASE PATIENTS" ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

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ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____ ਮਿਤੀ_____

ਪਤਾ _____ ਪਤਾ _____

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ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

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ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ